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JOURNAL
OF THE
ASIATIC SOCIETY OF BENGAL,

EDITED BY
THE SECRETARIES.

VOL. XXXI.

Nos. I. to V.—1862.

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“It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted: and it will die away, if they shall entirely cease.”

SIR WM. JONES.

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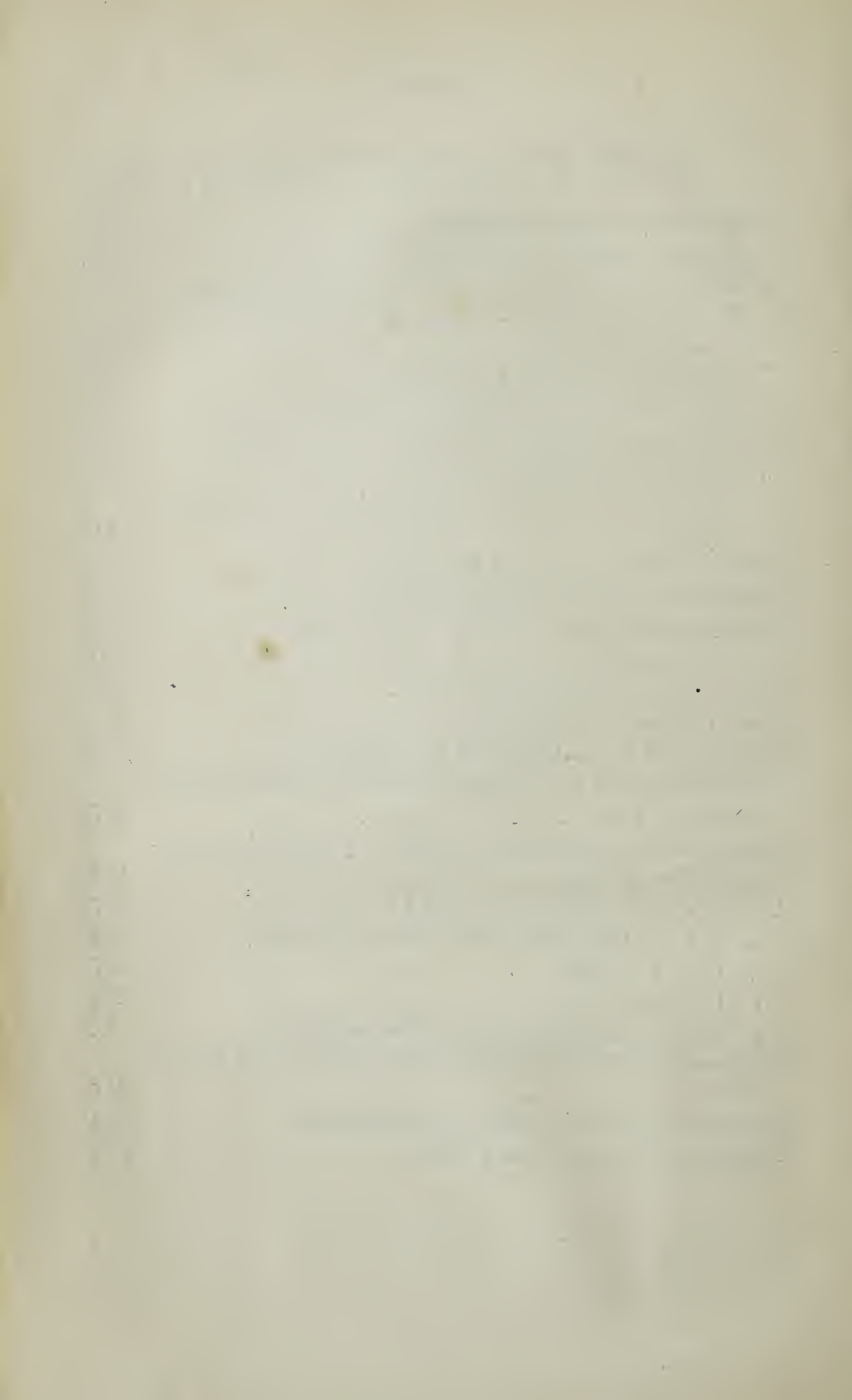
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JOURNAL

OF THE

ASIATIC SOCIETY.

No. I. 1862.

Vestiges of Three Royal Lines of Kanyakubja, or Kanauj; with Indications of its Literature.—By FITZ-EDWARD HALL, Esquire, D. C. L. Oxon.

By no means alone among Indian cities of old renown, Kanauj has shrunk from the once proud position of a metropolis into a town whose extent and importance are now most inconsiderable. If the entire site of its ruins was ever peopled simultaneously, its habitancy may at one time have competed with that of London; and yet our knowledge of its political vicissitudes, and even of its rulers and of its men of letters, is scarcely more than a dreary blank. It is my purpose, in the present brief paper, to collect, and, as far as possible, to connect, the detached facts, bearing on a portion of its mediæval history, which recent research has rendered available. These facts, in no small share, are of my own discovering.

From the *Harsha-charita** of Bāṇa, likewise author of the *Kādambarī*, and of the *Chandī-s'ataka*,† we learn, that, in his time, which is

* For a page or two, here, I do little more than copy from my preface to the *Vāsavadattā*; a publication not likely to meet the eyes of many readers of this Journal, or to be consulted for matters of historical fact.

† For a story about this poem, see my preface to the *Vāsavadattā*, p. 8. Whether the *Chandī-s'ataka* was written in rivalry of Mayūra's *Sūrya-s'ataka*, or whether the latter was prompted by the former, each of the compositions reminds one vividly of the other. I have seen but a single copy of the *Chandī-s'ataka*; and that was very incorrect. It contains one hundred and one stanzas, and is attributed, in the epigraph, to Bāṇa Bhaṭṭa. The beginning and end are subjoined, without amendment:

मा भाङ्क्षी निभ्रमं भूरविधुरताकयमास्या स्थरानं
याण्ये प्राण्येव नाऽयं कलयसि कलहश्रद्धया किं निशूलम् ।

known to have been shortly before the middle of the seventh century, the king of Kanauj was Harshavardhana, Harshamalla, or simply Harsha.* His elder brother was Rájyavardhana;† and he had a sister, Mahádeví, or Rájyas'rí. Their parents were Pratápas'íla, or Prabhákaravardhana,‡ and Yas'ovatí. Prabhákaravardhana's ancestor, of some unnamed degree, was Pushpabhúti, a native of S'ríkanṭha.

इत्युद्यत्कोपकेतून् प्रतिमवयवान् प्रापयन्त्येव देव्या
न्यस्तो वो मूर्ध्नि युष्मान् मरुदसुहृदस्त्रन् संहरन् च हिरन्धः ॥
स्रस्ताङ्गः सन्नचेष्टो भयहृतवचनः सन्नदोर्दण्डशस्त्रः
स्थानुर्दृष्ट्वा यमाजौ क्षणमिव समयः स्थानुरेवोपजातः ।
तस्य ध्वंसात् सुरारेर्महिषितवपुषा लब्धमानावकाशः
पार्वत्या वामपादः शमयतु दुरितं दारुणं वः स देवः ॥

Its sixty-sixth stanza occurs, anonymously, in the *Saraswatí-kanṭhábharana*. It is found in the *S'árngadhara-paddhati* as well, and is there ascribed to Bána. विद्राणे रुद्रवन्दे are the initial words.

* He was reigning when Hiouen-Thsang was in India, namely, between A. D. 629 and 645. *Voyages des Pèlerins Bouddhistes*, Vol. II., p. 247. Bána was a contemporary of Harsha, whom he first saw, he tells us, at S'ríkanṭha.

Hiouen-Thsang declares, that Harsha was called S'íláditya also. But of this assertion there is not an inkling in what I have seen of the *Harsha-charita*. Its truth is, indeed, open to grave question; for the titles of none, I suspect, but Kshatriyas end in *áditya*; and the Chinese pilgrim informs us, that Harsha was a Vais'ya. For the rest, he has, pretty evidently, confounded him with another S'íláditya, whom he terms a Kshatriya. Was Dhruvapaṭu,—called son-in-law of S'íláditya,—another name of Grahavarman, soon to be mentioned? *Voyages*, &c., Vol. I., pp. 111, 112, 206, and 370; Vol. II., p. 251; and Vol. III., p. 163.

For Dhruvasena, son of S'íláditya, see the *Journal of the Bombay Branch of the Royal Asiatic Society*, Vol. III., Part II., p. 216.

Of this Dhruvasena, or of some relative of his, bearing the same name, and under the title of Rájá of Vallabhínagarí, Lakshmívallabha, the Jaina, tells a story, in his *Kalpa-druma-kaliká*.

The partiality for Bauddhas, asserted, by Hiouen-Thsang, of Harsha, must, very probably, be received with liberal discount.

† Not Rájavardhana,—an all but impossible name,—as Hiouen-Thsang has it; but venially, considering the slight difference, to the ear, between the syllables *rája* and *rájya*. This I pointed out some years ago. But M. Julien still adheres to his authority. He says: “*Lo-che-fa-t'an-na* (Rádjavarddhana); en Chinois,** *Wang-tseng* l'augmentation, l'agrandissement du roi —Sur la suppression de *d* devant *dh*, voyez § XV. P. 76 of *Méthode pour déchiffrer et transcrire les Noms Sanscrits qui se rencontrent dans les Livres Chinois*, &c. Paris: 1861. In passing, there is no necessity for supposing, in this case, that *d* is suppressed before *dh*; for *vardhana* is just as correct Sanskrit as *varddhana*.

‡ I have no time to dwell on the speculations of Professor Lassen touching these persons. Misled by Hiouen-Thsang's indeterminate style of expression, he makes two kings, Harshavardhana and S'íláditya, out of one. Again, characteristically enough, he gratuitously provides, in S'íláditya, a father for one Dharmáditya,—a foundling, for anything ascertained to the contrary,—whom he elevates, and his son Jayáditya after him, to the throne of Kanauj. See the *Indische Alterthumskunde*, Vol. III., pp. 669-715, and 1162; and *Voyages*, &c., Vol. I., pp. 111, 112.

I write without the privilege of access to what M. Reinand has published on India as represented by the Arabian travellers.

Whether Pushpabhúti was, or was not, of regal condition does not appear. In religion, he was a S'aiva ; and one Bhairava Áchárya was his mystagogue.

Prabhákaravardhana accorded his preference, in matters of devotion, to the sun ; and Mádhavagupta served him as spiritual counselor. His exploits, as recorded, include the subjugation of the Húnas, with Sindhu, Gurjara, Gándhára, Láta, and Málava. Due allowance must, of course, here be made for exaggeration. Unquestioning confidence in the representations of Indian panegyrists would entail the conclusion, that, in the bygone days of this country, everybody, above all if a patron, was constantly vanquishing everybody else.

Rájyavardhana, by command of his father, made an expedition to the north, against the Húrahúnas.* Harsha followed him. While hunting on the skirts of the Himálayas, a domestic, Karangaka, brought intelligence, that the king was critically ill. Harsha hastened back, and was just in time to see him expire. On the very day of Prabhákaravardhana's decease, Grahavarman was massacred by the king of Málava, who also threw Rájyas'rí into chains. This took place at Kanauj.

Grahavarman, son of Avantivarman, of the Maukhara family, was husband of Rájyas'rí. As we do not find it stated distinctly, that the king of Málava had aggressed on Kanauj, we should understand, it may be, that Grahavarman owed his death to the son of that sovereign, who, it is said, was staying at the Kanaujan court. Apparently, he was there in character of hostage ; and perhaps he received the assistance of troops from his home unexpectedly.

Rájyavardhana, taking with him Bhandin,†—a subject of high

* As I have noted elsewhere, the Húrahúnas—and they may have been the same as the Húrahúnas,—are coupled with the S'akas in the *Mahábhárata*, *Sabháparvan*, s'l. 1843, 1844. See some remarks on the Húnas in the *Journal of the American Oriental Society*, Vol. VI., pp. 528, 529.

For the Halahúnas (?), see Professor Weber's Catalogue of the Berlin Sanskrit MSS., p. 241.

Colebrooke, speaking of a King Devapála, says : " The tribes of Lásata and Bhota, as well as Hun, are mentioned among his subjects, with the tribes of Gauda, Málava, Karnáta, &c. He was, therefore, sovereign of Thibet and Bootan, as well as of Hindusthan, Bengal, and the Dekhin. It was, probably, in Thibet that he encountered the Huns, and reduced them to subjection." *Transactions of the Royal Asiatic Society*, Vol. I., p. 227.

The Húnas are, thus, not recognized, by Colebrooke, as other than a people foreign to India. The notion, that there were not Hindu Húnas, I have previously shown to be, anyhow, not established entirely beyond scope of question.

† The minister " P'o-ni"—M. Julien's Bání, Bhaní, and Bhaní (?)—into

rank, by whom his education had been superintended,—and an army of ten thousand horse, marched to attack the king of Málava. Him he slew; but his own fate was defeat and death at the hands of Gupta,* king of Gauḍa, of which the news was brought back by Kuntala, a chief officer of cavalry. Sinhanáda and Skandagupta, the generalissimos, urge Harsha to make reprisals; and they lose no time in embarking on the enterprize.

The account of Harsha's progress towards the south-east I omit.† Before he could reach Gauḍa, Bhaṇḍin arrived, with spoils of the Málavas. Enquiries were at once made for Rájyas'rí. She had escaped from Kanauj, and had fled towards the Vindhya mountains. Thither Harsha directs his steps. He is visited by Bhúkampa, a military retainer to some local dignitary, Vyághraketu, son of S'arabha-ketu. These names, by the bye, seem to be coinages suggested by the fancied fitness of circumstances. Bhúkampa knows nothing of Rájyas'rí's present quarters, and recommends, that Harsha should seek for information at a neighbouring hamlet. She is discovered, when on the very point of burning herself.

At this juncture my least imperfect manuscript of the *Harsha-charita* unfortunately breaks off. With one more reference, I shall take leave of it. Among the Vindhyas, Harsha meets with a holy mendicant, Divákaramitra by name, a Bauddha pervert from Hinduism. In his vicinity resided various religionists, whose denominations I detail; it being interesting to know what Indian sects had existence in the seventh century. There were Árhatamaskarins, S'wetá-vratas, Páṇḍurabhikshus, Bhágavatas, Varṇins, Laukáyatikas, Jainas, Kápilas, Káṇádas, Aupanishadas, I's'warakáranins, Dharmas'ástrins, Páuránikas, Sáptatantavas, S'ábdas, and Páncharátras.

whose mouth a long speech is put, in the Chinese, is, in all probability, my Bhaṇḍin, or Bhaṇḍí—to write the word in the nominative: only Báṇa provides Bhaṇḍin with an alibi at the time Hiouen-Thsang sets “P'o-ni” to haranguing at Kanauj. *Voyages, &c.*, Vol. I., p. 112; Vol. II., p. 248; and Vol. III., pp. 435, 492.

* According to Hiouen-Thsang, Rájyavardhana fell a victim to the machinations of S'as'ánka, who reigned at Kārṇasuvarṇa. May not that potentate's full name have been S'as'ánkagupta?

The ruins of Kārṇasuvarṇa have been discovered, by Captain F. P. Layard, about twelve miles to the south of Murshidabad. See this Journal, for 1853, pp. 281, 282.

I have taken the last paragraph from my preface to the *Vásavadattá*, p. 52. The sentence standing just before it, in that page, is to be expunged.

† At Prágjyotishapura he entered into an alliance with Bháskaravarman, the king of Kámarúpa whom Hiouen-Thsang visited. *Voyages, &c.*, Vol. I., pp. 390, 391; and Vol. III., pp. 76, 77.

Harsha's immediate successors in empire have still to reveal themselves. It cannot have been a short catalogue of names that connected his own with those of the next known masters of Kanauj. Of these persons we catch a glimpse in an inscription* of which a redécipement will conclude this paper. For two facsimiles of the original I am indebted to the kindness of our Secretary. The kings, and their consorts, with whom that document brings us acquainted, are as follows :

*Kings.**Queens.*

I. Devas'akti.†	Bhúyiká.
II. Vatsarája, son of D.	Sundarí.
III. Nágabhata, son of V.	Mahísatá.
IV. Rámabhadra, son of N.	Appá.
V. Bhoja I., son of R.	Chandrabhattáriká.
VI. Mahendrapála, son of B.	Dehanágá and Mahídeví, mothers, respectively, of Nos.
VII. Bhoja II., son of M.	VII. and VIII.
VIII. Vináyakapála, son of M.	

Of these, Nos. I. and VII. are called Vaishnavas; No. II., a Máhes'wara; Nos. III., V., and VI., devotees of Bhagavatí; and Nos. IV. and VIII., heliolators.

Since Vináyakapála bestowed away land in close proximity to Benares,‡ we have proof, that, still in his time, which may have been as late as the middle of the eleventh century, the jurisdiction of Kanauj§ was of great compass.

* It has already been printed in this Journal, for 1848, Part I., p. 71. For Professor Lassen's groundless assignment to Udayapura of the kings with whom it is concerned, see my paper at pp. 195—210 of the last volume of this Journal.

† Every king is styled, in the original, *deva*, and every queen, *deví*,—or *θεδς* and *θεά*;—a mode of nomenclature which the later Greek-speaking people employed very generally, and the Romans, to some extent, in the same way. The author of the *Curiosities of Literature*, had he read excursively in the classical languages of Europe, must have modified his chapter on the "Titles of Sovereigns."

‡ We are informed, that the village of Tikkariká, the object of donation, was situate in the *bhukti* of Pratishthána, in the *vishaya* of Váránasí.

Pratishthána once designated, no less than other places, what is now Allahabad. It was, I apprehend, at this locality, characterized—to distinguish it from other Pratishthánas,—as Ś'ris'a's, or Vishnu's, Pratishthána, that Govindachandra, of Kanauj, bathed in the Ganges, previously to issuing a patent which, a few years ago, was still in existence. See this Journal, for 1858, p. 248. *Bhukti* appears as a synonyme of *bhoga*. *Vide ibid.*, for 1861, p. 197. Tikkariká lay on the high road opposite Kás'í. There is a Tikarí about two miles from Benares, across the river.

Thus, at a period when Kásí was, presumably, the more popular name of the city of Benares, the circumjacent territory was known as Váránasí.

§ In the seventh century, the principality of Kanauj was one of four into which north-eastern Hindusthán was distributed. Albirúní gives *Madhya-des'a*,

In Mahor, or Maholí, as the traditionary capital of a Rájá Bhoja, and in Bhojapura, near Farrukhabad, we possibly have traces of one or other of the Bhojas mentioned above.*

If Devas'akti had not been a usurper, Vináyakapála would naturally have deduced his ancestry from a more remote point than that at which he is seen to begin his family-tree.

In some part of the State of Gwalior there exists a huge inscription,†

“the middle country,” as its alternative name. See Sir H. M. Elliot's *Bibliographical Index to the Historians of Muhammedan India*, Vol. I., p. 34.

In the tenth century, the city of Kanauj is said to have been the first city in all India.

Kanauj, according to the *Haima-kos'a*, IV., 39, 40, was denominated Gádhipura, Kanyakubja, Kányakubja, Kaus'a, Kus'asthala, and Mahodaya. I have seen all these names, Kaus'a excepted, in other books, or in inscriptions. The *Harsha-charita* calls Kanauj Kus'asthala. In the inscription under notice we have Mahodaya.

Of the various forms of the word from which Kanauj, Kanoj, or Kanawaj is corrupted, the most usual, in old manuscripts and inscriptions, is Kanyakubja. Kányakubja likewise occurs, and with the countenance of the scholiast on the *Haima-kos'a*; and so, in the *Dwirúpa-kos'a*, does Kányakubja.

Mahobá, for numerous reasons, is not to be thought of as the modern representative of Mahodaya. Nor is Maudhá; nor is Mahedú. For indications guiding me to these conclusions, I have to thank Mr. Henry Dashwood, Judge of Banda.

For what looks like Mahodayá, as the name of a woman, a Thakkurání, see the *Asiatic Researches*, Vol. XV., second inscription at the end, ninth line.

The Hindu lexicographers apprise us, that Pátaliputra had a second appellation, that of Kusamapura. Hiouen-Thsang additionally declares, that the latter is the older. The late Professor Wilson, speaking of the Pushpapura of Daṇḍin, says: “The term Pushpapura, the Flower-city, is synonymous with Kusumapura, and is essentially the same with what should probably be the correct reading, Pátalipura, the Trumpet-flower city. A legend as old as the eleventh century, being narrated in the *Kathá-sarit-ságara*, published and translated by Mr. Brockhaus, has been invented, to account for the name Pátaliputra; but this has evidently been suggested by the corruption of the name, and does not account for it. That Patna was called Kusumapura, the Flower-city, at a late period, we know from the Chinese-Buddhist travellers, through whom the name Ku-su-mo-pu-lo became familiar to their countrymen.” *Das'a-kumára-charita*, Introduction, p. 8.

Had Professor Wilson any doubt, when he used the expression “at a late period,” that Hiouen-Thsang came to India in the seventh century?

But of Kanauj also, according to the Chinese pilgrim, Kusamapura was the more ancient designation. In support of this statement, Hindu authority is still wanting. See *Voyages*, &c., Vol. I., p. 137; and Vol. II., pp. 224, 410.

* Maholí is on the river Gumti, fifty-five miles north-east from Kanauj. Col. R. R. W. Ellis has it, that Bhoja reigned there in Samvat 1011, which corresponds to A. D. 954: but the authority for this statement is not very convincing. If the Bhojapura near Farrukhabad was named from a king of Kanauj, his memory has quite perished in what was once his own kingdom; seeing that the pandits of Bhojapura confound him with Bhoja of Dhárá. See pp. 173, 175, 179, and 185 of Col. Ellis's *Legendary Chronicles of the Buildings of Ancient India, and Genealogical Lists of the Rajput and Brahmin Tribes*. This suggestive volume was printed, for private circulation, at Delhi, in 1854.

† It is in forty-six lines, each of which, measuring about two yards long, contains, or contained, not far from two hundred and twenty-five characters.

a transcript of which I owe to Colonel Alexander Cunningham, a gentleman whose name has long been most honourably identified with the subject of Indian archæology. Besides that my copy is full of breaks at the beginning, the native who executed it was, evidently, unable to discharge from his mind the impression, that he had before him ill-written modern Devanāgarī. Though intending to prepare a facsimile, he has, in patches by the dozen, altered as many as eight or ten consecutive letters, and in such sort,—no uniformity being observed in his commutations,—as to produce the very perfection of all that is unintelligible. It is not much that, without hazard of being deceived, I have succeeded in gleaning from his laborious infidelity.

From the two opening lines of the transcript, if they were un mutilated, we might discover who preceded the first king of name now legible in the inscription,—Mahendrapāla. Near where he is spoken of is the date 960. Next comes Bhoja, and then Mahendrapāla again, with the date 964. Further on Kshitipāla is mentioned; and, after him, Devapāla, the date 1005 being close by. These dates, I may observe, are not sufficiently particularized for one to certify their era by calculation.

Now, we have here, at least in seeming, the succession of Mahendrapāla, Bhoja,* and Mahendrapāla. Before the first of them, another Bhoja may originally have been enrolled; and, not impossibility, we have, after all, but a single Mahendrapāla to enumerate. It is, then, barely suggestible, that, in these kings, we meet with the progeny of the Kanaujan Devas'akti. The kings of the record before us are memorialized as having granted away land, and other things, by way of local donaries,† in ten several years, ranging from 960 to 1025.

* The Bhoja—whose father has been made out to be Rāmachandra,—of the Thanésur inscription is, manifestly, a different person from any Bhoja referred to in this paper. See this Journal, for 1853, pp. 673-679.

S'ankaravaraman, of Cashmere, is said to have seized upon the kingdom of a Bhoja. Professor Wilson, who will hear of only one Bhoja, assumes, that he of Dhārā is intended. See the *Asiatic Researches*, Vol. XV., pp. 85, 86.

† Most of them are appropriated to the service of Vishṇu,—also called Nārāyaṇa, and Chakraswāmin,—who has, throughout the deeds, the title of *bhaṭṭāraka*. But other deities, great and small, are not forgotten; as S'iva, Umā, Vāmana, Vais'wānara, Tribhuvanaswāmin,—whoever he was,—and the obsolete Vaṇḍukīya and Bhāilaswāmin.

I have now produced two authorities for Chakraswāmin, to add to Albirūnī, cited by Messrs. Boehtlingk and Roth, in their *Sanskrit-wörterbuch*. See the *Journal of the American Oriental Society*, Vol. VII., p. 27, and my note at p. 42, *ibid*.

Devapála's date, accordingly as it is computed in Samvat, or in S'aka, is equivalent to A. D. 968, or to A. D. 1103. On the theory, that we have here to do with the rulers of Kanauj, the fact, that Vináyapála is passed by unnoticed, may be accounted for by supposing, that, in his reign, benefactions to the Gwalior temple were intermitted. Indeed, it would be unsafe to affirm, that his name may not lurk, undetected, in the waste of incoherence which divides Mahendrapála from Kshitipála. If Kanauj at any period reached as far as Benares in one direction, and as far as Gwalior in another, it must have been a sovereignty of first-class dimensions.*

We now come to the last line of Kanauj Hindu kings, with any propriety so entitled.† Little more has transpired, regarding them, than their appellations; and some of the years in which they held power, with exception of the first.

I. Chandra.

II. Madanapála, son of C. A. D. 1097.

III. Govindachandra, son of M. A. D. 1120 and 1125.

IV. Vijayachandra, son of G. A. D. 1163.‡

V. Jayachandra, son of V. A. D. 1177, 1179, and 1186.

Chandra, who conquered Kanauj, was son of Mahíchandra, son of Yas'ovigraha. It is doubtful whether Yas'ovigraha was a king; and whether, if so, he is to be identified with one of two magnates

* Benares, when the inscription from Sárnáth was written, was a dependency of Gaúda. That inscription, which—provided the printed copy is trustworthy,—exhibits the names of Kings Mahípála, Sthirapála, and Vasantapála, is dated in a year 1083. Reckoned from Vikramáditya, this is equal to A. D. 1026; and to A. D. 1161, reckoned from S'áliváhana. If A. D. 1026 be its true time, Benares passed from the possession of the rulers of Kanauj antecedently to the invasion of Chandra. See the *Asiatic Researches*, Vol. V., octavo edition, pp. 131, etc.

For an inscription still inedited, see the *Asiatic Researches*, Vol. XVII., p. 621. It came from Jhoosee, across the Ganges from Allahabad. I write with the plate before me: but so numerous and so grave are its errors, that I shall not adventure a full translation. It contains a land-grant, the donor of which, King Vijayapála, son of Ádyapála, son of Trilochanapála,—seems to have lived on the banks of the Ganges, near Prayága: प्रयागसमीपगङ्गातटा. Pratishthána is mentioned in it. The date is Samvat 1084, S'rávana, vadi 4.

It should appear, therefore, that, already in the eleventh century, there were independent chieftains intermediate to Kanauj and Benares.

No equally early instance has, I believe, before been met with, in Sanskrit, of Prayága as naming the confluence of the Ganges and Jumna. But Prayága was familiar to Albirúní.

† See my paper on this family, in this Journal, for 1858, pp. 217-250.

‡ With him synchronized a reputed tyrant, Hammíra. Captain Fell confounds this Hammíra with Hammíra of S'ákambharí, who lived in the fourteenth century; and he misreads Col. Wilford. See the *Asiatic Researches*, Vol. XV., pp. 444, 448, and 455; and Vol. IX., pp. 188, 189.

named Vighraha.* As for Jayachandra, he was defeated, and his monarchy completely overthrown, by Shihábuddín, in A. D. 1194.†

Apart from the personages of whom I have been treating, detached kings of Kanauj, as mere names, are not unknown to investigators into the past history of India. In the main, however, great uncertainty invests all that has been asserted of them; and, furthermore, it does not fall within the programme of this paper to make them the subject of special inquiry.‡

Considering the illustrious station which Kanauj long maintained among Indian cities, we should expect to be able to refer to it a fair

* See this Journal, for 1858, pp. 217, 218, foot-note.

† “Jayachandra went on a pilgrimage to Sinhálá (Ceylon), and received from Vírabhadra, King of Sinhálá (whom, by the bye, he conquered) a most beautiful female. Prithivirája, (commonly called Pithaurá), the last prince of the Chauhan dynasty, already enraged at Jayachandra, from a supposed assumption of having undertaken a sacrifice at which Prithivirája ought to have been allowed to preside, was exasperated at this; and a long and bloody war took place between the parties. This lasted until Anno Domini 1192, when Shihábuddín invaded the dominions of Pithaurá: Jayachandra entered into a league with the invader, and Pithaurá was slain in a desperate battle fought on the plains of Thanesar. The alliance between Shihábuddín and Jayachandra did not last long; for, in the year 1194, a great battle was fought between them, near Etawa, in which Jayachandra’s army was totally routed; he himself was obliged to flee, and, in attempting to cross the Ganges in a small boat, was drowned.” Captain Fell, in the *Asiatic Researches*, Vol. XV., pp. 456, 457. But compare Vol. IX., pp. 171, 172; and the *Ayín-i-Akbarí*, Vol. II., pp. 97-99.

According to the *Rauzatu-t-táhirín*, Shihábuddín captured three hundred elephants from the Rájá of Kanauj. See Sir H. M. Elliot’s *Bibliographical Index to the Historians of Muhammedan India*, Vol. I., p. 301.

‡ In Kshemankara’s Jaina version, in Sanskrit, of the *Sinhásana-dwátrins’atí*, it is stated, that there was a Rájá Maruṇḍa, of Kanyakubja, whose ghostly adviser was Pádalipta Súri. In the *Kathá-kos’a*, another Jaina work, Pálitta,—the Prakrit form of Pádalipta,—founder of the city of Pálitáná, is said to have instructed Rájá Muruṇḍa: but this prince’s place of residence is not mentioned. He has not, I think, hitherto fallen under any one’s notice. It will have been observed, that the name is variously spelled.

One Yas’ovarman, king of Kanauj, is said, in the *Rája-tarangíní*, to have been dispossessed of his dominions by Lalitáditya, sovereign of Cashmere. This subjugation Professor Wilson, who surmises that it could have been but temporary, assigns to the first half of the eighth century. But the chronology of the *Rája-tarangíní* stands, in general, in much need of adjustment. *Asiatic Researches*, Vol. XV., pp. 45, 463.

Vírasinha is reported to have been the king of Kanauj who sent to Bengal the ancestors of its present Bráhmans. See this Journal, for 1834, p. 339, foot-note; and *Third Series of Papers grounded upon the General Reality of the Pauráṇika Characters*, &c. Tellamor, Masurí: 1856.

They were invited by “Adís’wara, king of Gauḍa, who is said to have reigned about nine hundred years after Christ.” Colebrooke’s *Miscellaneous Essays*, Vol. II., pp. 187, 188. Colebrooke originally wrote “Adisúra,” “who is said to have reigned about three hundred years before Christ.” *Asiatic Researches*, Vol. V., octavo edition, p. 64.

Colonels Wilford and Tod, the Muhammadan writers, and the numismatists, as contributors to our knowledge of Kanauj, need not detain us.

contingent of the Sanskrit literature of the silver age. Yet, so far as I can recollect, the sole extant* Sanskrit composition hitherto shown, except by myself, to be associated with it, is the *Vis'wa-prakás'a*, an homonymic lexicon, by Mahes'wara, written in the year 1111 of our era.†

To the *Vis'wa-prakás'a* we may certainly add the numerous productions of S'ríharsha, poet, philosopher, and chronicler. Out of nine of his works whose titles have come down to us, only two are known to have survived to the present day; the *Naishadha-charita* and the *Khandana-khanda-khadya*. All that we can be sure of, in respect of the age of S'ríharsha, is, that he was later than Kings Chhanda and Sáhasánka, and earlier than the *Saraswatí-kanthá-bharaṇa*, in which the *Naishadha-charita* is quoted.‡

* On the faith of the *Rāja-taranginī*, a Bhavabhúti was patronized by Yas'o-varman of Kanauj. Was he the well-known dramatist? As there has been a plurality of Kálidásas, why may there not have been a plurality of Bhavabhútis likewise? Vákpati is named along with Bhavabhúti; and there were at least two poets Vákpati. See the *Asiatic Researches*, Vol. XV., pp. 45, 86.

† Having Kanauj in view, Professor Wilson alleges, that "A prince named Sáhasánka must have occupied the throne about the middle of the tenth century; as Mahes'wara, the author of the *Vis'wa-prakás'a* in the year 1111, makes himself sixth in descent from the physician of that monarch." *Asiatic Researches*, Vol. XV., p. 463: and see *Sanskrit Dictionary*, first edition, Preface, pp. xxvii., xxix.

This is a mistake. The account which Mahes'wara gives of his progenitors is as follows. First was Harichandra, a medical writer, who annotated on Charaka, and professionally served King Sáhasánka. Descended from Harichandra, but distant from him we know not how many generations, was Kṛishṇa, physician to an unnamed king of Gádhipura, or Kanauj. Kṛishṇa had a son, Dámodara; and Dámodara had two sons, Kṛishṇa, and another whose name is not specified. The latter had a son, Kes'ava. A son of the former was Brahma(?), who was father of Mahes'wara.

For the above I have consulted a very old manuscript; and it differs from those which have been examined in England. See Dr. Aufrecht's *Catalogus Cod. Manuscript. Sanscrit, &c.*, Pars. I., pp. 187, 188.

Mahes'wara, besides being a lexicographer, wrote, he says, with other "great compositions," the *Sáhasánka-charita*. Sáhasánka, of whom we have just read, was, without much doubt, lord of Kanauj. S'ríharsha, to whom we shall come presently, wrote a *Nava-sáhasánka-charita*. This name lends colour, at first sight, to the view, that S'ríharsha was posterior to Mahes'wara. The reverse was the case, possibly; and S'ríharsha may have rivalled some earlier biographer of Sáhasánka; whence his choice of a title.

Mahes'wara was contemporary with king Madanapála; and Sáhasánka, if of Kanauj, was of the family from which the realm was usurped by Chandra.

‡ For further particulars, see the Preface to the *Vásavadattá*, pp. 17, 18, foot-note.

A caustic anecdote is told of S'ríharsha. I have often heard it from the mouths of the pandits; and it has been related, in print, by Pandit Ís'wara-chandra Vidyáságara, in his Bangálí pamphlet entitled *Sanskṛita-bhāshá-o-Sanskṛita-sáhitya-s'ástra-vishayaka-prastáva*.

Bána's *Harsha-charita*, *Kúdambarí*, and *Chandí-s'ataka* as was remarked near the beginning of this essay, were composed at Kanauj, and when its sceptre was wielded by Harshavardhana. Contemporaneous in publication were the *Ratnávalí* and the *Nágánanda*, dramas held in high esteem by the Hindus.

The *Ratnávalí* I was once disposed to adjudge to Bána; and this adjudication, as against that of the late Professor Wilson, has not, I believe, been contested. But, on closer inspection of materials which are accessible to no one but myself, I have struck upon a consideration partially adverse to what may have been regarded as an irreversible award.*

In the *Ratnávalí* there is a stanza which is read, word for word, in the *Harsha-charita* as well.† It may be translated thus; "Destiny, when favourable, fetches, even from another continent, or even from the midst of the sea, or even from the bounds of space, that which is desired, and instantly brings it to pass." Hindu poets not unfrequently repeat themselves; but downright plagiarism, among them, of one respectable author from another, is unknown. That the verses in discussion are not interpolated, is sufficiently clear from the fact of their being altogether apposite to both the connexions in which they occur. Are they, then, an unacknowledged quotation?

But, again, the *Ratnávalí* contains a stanza which is embodied, with the change of a single word, in the *Nágánanda* likewise. In a literal version its meaning is: "Our able poet is the fortunate Harsha. Moreover, this auditory appreciates merit; and the achievements of the Vatsa prince‡ are taking with the people; and we are skilful

On finishing the *Naishadhíya*, S'ríharsha showed it to his maternal uncle, Mammata Bhaṭṭa, author of the *Kāvya-prakás'a*. The critic, after perusal, expressed a regret, that he had not seen it sooner. In compiling his chapter on blemishes, he had been put to the trouble of travelling through numberless volumes, in search of illustrations. Had he only known of the *Naishadhíya* in time, he might have drawn on it, he declared, without going further, to exemplify every possible species of defect.

* See the preface to the *Vásavadattá*, pp. 12-16, foot-note.

† In the fifth chapter. And see the Calcutta edition of the *Ratnávalí*, p. 3. The original words are these:

द्वीपादन्यत्सादपि मध्यादपि जलनिधेर्दिशोऽप्यन्तात् ।

आनीय भटिति घटयति विधिरभिसतमभिमुखोभूतः ॥

This is quoted, as from the *Ratnávalí*, in the *Saraswatí-kanthábharaṇa*.

‡ Professor Wilson everywhere errs in assuming *Vatsarāja* to mean "King Vatsa." Udayana is intended. The city of Kaus'ambí is styled *Vatsa-pattanam*, "the capital of Vatsa:" and Vatsa denoted a people, and perhaps a region also,

in dramatic representation. Any one particular of these is a source for the attainment of whatsoever aspiration. What, then, *can be said*, when, owing to my affluent good fortune, this entire category of excellencies is *presented* in combination ?”* For *Vatsarāja* we have, in the *Nágánanda*, *Siddharāja*, a descriptive epithet of the hero of the play, *Jímútaváhana*.

Now, both the *Ratnávalí* and the *Nágánanda* are dedicated to Harsha : for so we are to understand their being attributed to him, as if he were author of them ; a custom by no means unprecedented in the annals of Indian literature. The writer of the *Ratnávalí* was a Hindu ; that of the *Nágánanda*,† a Bauddha. The latter may

but not a man. See the preface to the *Vásavadattá*, p. 4, foot-note ; and the *Haima-kos'a*, IV., 41.

* श्रीहर्षो निपुणः कविः परिषदेषु गुणग्राहिणी
लोके चारि च वत्सराजचरितं नाद्ये च दत्ता वयम् ।
वस्त्रैकैकमपीह वाञ्छितफलप्राप्तेः पदं किं पुनर्
मद्भाग्योपचयादयं समुदितः सर्वो गुणानां गणः ॥

See the printed *Ratnávalí*, p. 2. My text, for which I have collated several manuscripts, punctually agrees with it, as concerns this extract. The manager is here conciliating the favour of the audience on behalf of the troop of players, himself, &c.

Professor Wilson says, respecting his English recension—as it really is—of the *Ratnávalí*, that it may “serve to convey some idea, how far the translator may be suspected of widely deviating from his text in the preceding dramas ;” where verse is rendered in verse. The passage just given is professedly reproduced, by him, in this strange manner : “S’rí Harsha is an eminent poet ; the audience are judges of merit ; the story of Vatsa is current in the world ; and we, the actors, are experienced in the histrionic art ; and I hope, therefore, that, with so precious a poem, and such means of doing it justice, the opportunity afforded me of appearing before so distinguished an assembly will yield me the fruit of all my desires.” *Select Specimens of the Theatre of the Hindus*, second edition, Vol. II., pp. 261 and 265.

† It is somewhat singular, that this play should have escaped the questing of Professor Wilson ; as it is not very extraordinarily rare, and as it is more than once referred to, and extracted from, in the *Das’arúpávaloka*. I have, among my private manuscripts, two copies of it, a complete one, and one broken. It is in five acts, and is of no great length. Its fable is the story of *Jímútaváhana*, now rendered familiar by the publication of the first volume of the *Kathá-sarit-ságara*.

Of its two benedictory stanzas the first is subjoined :

ध्यानव्याजमुपेत्य चिन्तयसि कामुन्मील्य चक्षुः क्षणं
पश्याऽनङ्गशरातुरं जनमिमं चाताऽपि नो रक्षसि ।
मिथ्या कारुणिकोऽसि निर्घृणतरस्वत्तः स कोऽन्यः पुमान्
सैर्यं मारवधूभिरित्यभिहितो बुद्धो जिनः पातु वः ॥

“ ‘With eyes unclosed for a moment, on what female art thou ruminating, under pretext of pious contemplation? Behold these persons, *ourselves*, vexed

have borrowed a couplet from the former; or the former, from the latter: and Báṇa may have introduced, quotationwise, into his *Harsha-charita*, from a work not his own, the fatalistic verses of the *Ratnávalí*. However all this may have been, it is scarcely questionable, that the *Ratnávalí*, the *Nágánanda*, and the *Harsha-charita*, were produced in the seventh century, and at the court of Harsha of Kanauj; and it will, perhaps, still be proved, that the first and the third were from the pen of one and the same person.*

“The mere question,” observes Dr. Rowland Williams, “whether the court at which Kálidása flourished is that of Vikramáditya, at [in] Málava, 56 B. C., or that of another prince, at Ujjayiní, [?] nearly a thousand years later, shows the uncertainty of most things in Indian literature.”† A Kálidása, and indubitably the greater Kálidása, being noted with eulogy by Báṇa,‡ it will not answer, any longer, to think of bringing him down to the days of Bhoja of Dhárá.§ Indeed, no good cause has as yet been produced for rejecting the Indian tradition, that Kálidása antedated the Christian era.

One poet more remains, whose connexion with Kanauj may be counted a certainty. I mean Rájās'ekhara, author of the *Viddha-s'ála-bhanjiká*, of the *Prachanḍa-pāṇḍava*, or *Bála-bhúrata*, of the *Bálarámáyana*,|| and of the *Karpúra-manjarí*. In all four works, he speaks of his patron as being Mahendrapála, of the city of Mahodaya. Mahendrapála is also called Mahípála; and his father, Nirbhayanarendra. To the

by the shafts of Ananga. Albeit a guardian in name, thou dost not defend. Hypocritically art thou compassionate. Who is more extremely cruel than thou? May the Buddha, victorious over his passions, who was thus enviously addressed by the mistresses of Mára, protect you.”

Jina is the generic appellation of any Buddha; but here, I think, the word is the subject of a paronomasia.

* S'itikanṭha, in his commentary on the *Kávyā-prakás'a*, the *Kávyā-prakás'anidars'ana*, gives Báṇa, not Dhávaka, as Mammata's name of the poet who was enriched by Harsha. He does not speak of the *Ratnávalí* as being the work which brought gain to the poet; but the omission is supplied by other annotators, such as Vaidyanátha, Jayaráma, and Náges'a. See the Preface to the *Vásavadattá*, p. 16, foot-note.

† P. 287 of *Christianity and Hinduism*. Cambridge: 1856.

‡ See the Preface to the *Vásavadattá*, pp. 14, 15, foot-note.

§ It is high time to give up speaking of this prince as a great patron of literature. His pretensions to be so considered rest on the frailest foundation possible.

|| Professor Wilson knew it by a reference only. I have seen a complete copy; the property of Esobá S'ástrin, of Saugor. It is in ten acts.

first the poet was preceptor.* If Nirbhayanarendra was the title of the Bhoja I. of the Kanauj copper-plate, whose son was Mahendrapála, it cannot be that this Rájas'ekhara compiled and supplemented the Bilahari inscription,† which I have assigned, but with much hesitation, to the early part of the twelfth century.

INSCRIPTION REFERRED TO AT P. 5.

अम । खस्ति ।

श्रीमहोदयसमावासितानेकनौहस्यश्वरथपत्तिसम्पन्नः‡ शुद्धाचारात् परमवैष्णवो महाराजश्रीदेवशक्तिदेवस्तस्य पुत्रस्तत्पादानु-
व्यातः श्रीभूयिकादेव्यामुत्पन्नः परममाहेश्वरो महाराजश्रीवत्स-

* In the *Viddha-sála-bhanjiká*, Mahendrapála is called *yuvarája*; and the terms *yáyávvara* and *dauhiki*, perhaps "maintainer of a sacrificial hearth" and "son of Duhika," are there applied to Rájas'ekhara.

Of Rájas'ekhara, Professor Wilson has said, with the *Prachanda-pándava* before him: "He is here described as a poet who occupies that rank in the literature of the day which Válmíki, Vyása, Bharṭṛihari, and Bhavabhúti, have severally filled. * * * * The *sútradhára* observes, of the assembly, that it is formed of the learned men of the great city of Mahodaya, or the great Udaya; possibly Udayapur, the princes of which city affect to trace their descent from Ráma. The modern city of Udayapur, however, was not founded before the sixteenth century; and the name must be applied to some other place, unless it be no more than a title meaning the very splendid or fortunate. We cannot doubt the long prior existence of the drama, from the mention made of it, or of its author, in the works to which reference is made in the preceding article, and to which we may add the *Kávyá-prakás'a*, a work probably anterior to the foundation of the modern Udayapur. Mahodaya may be the origin of the name of Mahoba, a city of which extensive ruins remain, and of which the history is little known." *Select Specimens of the Theatre of the Hindus*, second edition, Vol. II., pp. 361, 362.

The *Prachanda-pándava* is not mentioned in the *Kávyá-prakás'a*: but the *Karpúra-snanjarí* is. As for Mahodaya, and its identity with Kanauj, the Professor forgot here to look into his own dictionary. Further, he has foisted in Vyása; and he has arbitrarily altered Bharṭṛimeṇṭha into Bharṭṛihari:

बभूव वल्मीकभवः पुरा कविस्
ततः प्रपदे भुवि सर्द्धमेष्टताम् ।
स्थितः पुनर्यो भवभूतिरेखया
स वर्तते सम्प्रति राजशेखरः ॥

"Of yore there was a poet sprung from a white-ant-hill (*valmíka*). Subsequently he became Bharṭṛimeṇṭha; and, again, he existed as Bhavabhúti. The same is now Rájas'ekhara."

For the story of Válmíki's resurrection from a termite-mound, see this Journal, for 1852, pp. 494-498.

A specimen of Bharṭṛimeṇṭha's poetry is extracted in the *S'árngadhara-paddhati*; with two specimens of Meṇṭha's.

† See p. 321 of the preceding volume of this Journal.

‡ The *visarga*, as obviously being required, has been supplied. The अ has been inserted by conjecture: but the conjunct in हस्य could not but at once suggest it.

राजदेवस्तस्य पुत्रस्तत्पादानुध्यातः श्रीसुन्दरीदेव्यामुत्पन्नः परं भगवतीभक्तो महाराजश्रीनागभटदेवस्तस्य पुत्रस्तत्पादानुध्यातः श्रीमहीसटादेव्यामुत्पन्नः परमादित्यभक्तो महाराजश्रीरामभद्रदेवस्तस्य पुत्रस्तत्पादानुध्यातः श्रीमदप्यादेव्यामुत्पन्नः परं भगवतीभक्तो महाराजश्रीभोजदेवस्तस्य पुत्रस्तत्पादानुध्यातः श्रीचन्द्रभट्टारिकादेव्यामुत्पन्नः परं भगवतीभक्तो महाराजश्रीमहेन्द्रपालदेवस्तस्य पुत्रस्तत्पादानुध्यातः श्रीदेहनागादेव्यामुत्पन्नः परमवैष्णवो महाराजश्रीभोजदेवस्तस्य भ्राता *श्रीमहेन्द्रपालदेवपुत्रस्तत्पादानुध्यातः श्रीमहीदेवीदेव्यामुत्पन्नः परमादित्यभक्तो महाराजश्रीविनायकपालदेवः प्रतिष्ठानभुक्तो† वाराणसीविषयसम्बद्धकाशीपारपथकप्रतिबद्धटिक्कारिकाग्रामे समुपगतान् सर्वानेव यथास्थाननियुक्तान् प्रतिवासिनश्चेदमाज्ञापयति ।

उपरिलिखितग्रामः‡ सर्वायसमेत आचन्द्रार्कक्षितिकालं पूर्वदत्तदेवब्रह्मदेववर्जितो मया पित्रोः पुण्याभिवृद्धये §दर्भिसगोत्र॥ अथर्वसब्रह्मचारिभट्टभुक्ताकाय षष्ठां गङ्गायां स्नात्वा प्रतिग्रहेण प्रतिपादित इति विदित्वा भवद्भिः समनुमन्तव्यं प्रतिवासिभिरप्याज्ञाश्रवणविधेयैर्भूत्वा¶ सर्वाया अस्य समुपनेया इति ।

श्रीहर्षेण प्रयुक्तस्य शासनस्य स्थिरायतः ।

संवत्सरो * * * फाल्गुनवदि । * निबद्धम् ।

SAUGOR, October 5, 1861.

* Instead of this, the former decipherment has श्रीमहेन्द्रपालदेवस्तस्य पुत्रस्तत्पादानुध्यातः.

† Not -भुक्तान्, as was at first read.

‡ Here I have converted a sibilant into a *visarga*.

§ Of the *gotra* of Darbhī mention is frequent. For Dārbhīya, see the *Indische Studien*, Vol. I, pp. 209, 255; and Vol. II., pp. 308, 309: for Darbhya, Professor Max Müller's *History of Ancient Sanskrit Literature*, first edition, p. 283: and, for Darbha, Professor Weber's *Catalogue of the Berlin Sanskrit Manuscripts*, p. 56, line 7.

|| Here is an error, but of easy correction. There should have been, of course, दर्भिसगोत्रायाऽथर्व०.

¶ The original has, by mistake, -विधेये०.

* Amended from संवत्सरो. Then follow two unrecognized numerals, denoting a dynastic year, and an indistinct compound character of unknown significance. Further on, the day of the semi-lunation is expressed by a single numeral. It is the same as the first of the two just spoken of.

*Notes of a brief visit to some of the Indian remains in Java.—By
Lieut.-Colonel HENRY YULE, Bengal Engineers.*

It is not likely that much of what I have to say on this subject has not already been told. But these remains are now seldom visited by travellers from India; the accounts of them are probably not familiar; and they are surrounded with such deep interest to all who care for Indian antiquity, that I trust my brief account will not be regarded as superfluous.

It is well known that the central and eastern portions of Java abound with remains of unquestionable Indian origin, both Buddhistic and Brahminical, uniting with the evidence of language and literature in testifying to an extensive intercourse between the countries, of which nothing like real history remains. The accounts of these ruins by Raffles and Crawfurd had long ago excited my curiosity, and the opportunity I enjoyed some years ago of exploring analogous remains in Burma had converted this into a deeper and more intelligent interest. When therefore in September 1860 I found myself obliged to take a sea voyage, the chance of seeing with my own eyes these mysterious remains not a little influenced me in directing my course to Java.

The localities visited were Boro Bodor and its vicinity in the valley of Kadú, a very garden of cultivation even in that pearl of islands, and Brambánan on the borders of the two still quasi-independent states of Solo and Djokjokarta.

My companion in these visits was Dr. Macpherson of the Madras Army, whose praiseworthy exertions in the exploration of primeval antiquities at Kertch during the Crimean war are well known. In our visit to Boro Bodor, we had the advantage of the company of Mr. Elliott Martin, an English gentleman long resident as a planter in the interior of Java. Boro Bodor we visited from Magelang, the "Suddur station," as we should call it, of the Kadú district, from which it is thirteen miles distant.

Our first object was the temple of Mundót, about 3 miles from the greater monument, Boro Bodor.

This temple was not known to Raffles and Crawfurd, and possibly has not been described in any English book. Nothing but a tumulus



FIG. 1.

TEMPLE OF MUNDOT.

is said to have been visible on the spot when accident, in the year 1834, led to the discovery that a temple was concealed beneath. As there is no soil but highly cultivated mould in the neighbourhood, the ruins must have been buried by volcanic ashes. Indeed, there can be little doubt that it had been covered by an eruption from the nearest of the still active volcanoes, Mir Api, which, though the least elevated of four magnificent cones that tower over the district of Kadú, rises to a height of 9208 feet above the sea. The discoverer of the temple was Mr. Hartman, the Resident (or as we should say Commissioner) of Magelang, one of the ablest and most popular officers of the Dutch government, and whose memory continues with singular permanence in the recollection of the people. The interior also of the temple was choked with soil, and according to the native story that was told us, the bottom was deeply covered with bat's guano, so that the labourers employed on the offensive business of removing it got a rupee a day from Mr. Hartman. This would seem to show that the eruption occurred long after the temple had been abandoned. The adjacent soil now stands 3 or 4 feet above the base of the building, but an area has been excavated all round to the original level. All is now kept with that neatness and regard for appearances which so eminently characterises the rulers of Java. The temple is surrounded by a garden and fence, with a bungalow for visitors.

The general aspect of the temple is shown in the sketch which I produce, (Fig. 1), and strongly recalls that of some of the smaller ancient temples in Burma. It stands on a basement of about 70 feet square and from 15 to 16 feet high. The superstructure is about 45 feet square externally, and its height including the basement I guessed at about 65 feet. On three sides there is a very slight projection, giving a quasi-cruciform plan to the building, and on the fourth a portico now gone far to ruin, and a flight of steps descending from the elevated basement.

The entrance door is, as far as I could make out, towards the north. I had no compass, and the sun was so nearly vertical, that I could not satisfy myself of its precise direction. In other Buddhist temples that I have seen, whether in Java or Burma, the opening has been to the East.

The cube of the building has been surmounted by a pyramidal

roof, rising in terraces apparently. But it is in too great ruin to allow of one's determining its exact form. When perfect the temple must have been a noble structure,

The material is a close-grained but not heavy volcanic stone, well cut, and very finely jointed, but without mortar. It is much cracked, and whole surfaces of wall threaten to come down.

This absence of mortar is common to all the ancient buildings that I visited, and the result is a degree of dilapidation far greater than age, or even perhaps earthquake, need have occasioned in structures otherwise so solid, a dilapidation which is rapidly advancing and cannot be materially retarded.

The absence of mortar is also a notable feature in the ancient brick temples of Pagan in Burma, in the temple at Buddh-Gya, (but that is certainly Burmese work), and I believe also in the Ceylonese remains, as it is in the topes of Sanchi and Benares. It would be curious to ascertain what is the earliest Indian building in which the joints are set in mortar, and whether the absence of it is peculiar to Buddhist or to sacred buildings. There was no *ignorance* of the use of lime, as I shall mention presently.

The greatest singularity of this, as of some others of the temples in Java, consists in the strange combination of Buddhism and Brahminism which they present. In fact an intelligent Madras servant who was with me, and who explored everything with great interest, hit the right nail on the head in saying "Master; inside temple like Burmese, outside like Hindoo." The inside cell is about 20 feet square rising vertically 16 or 18 feet and then tapering upwards by the projection of each successive layer of stone an inch or two beyond that which underlies it, like the under side of a staircase. It is in fact a form of aspiration towards the arch which is found in primitive buildings in many parts of the world, in the Pelasgian remains of the Peloponnesus and of Asia Minor, and in the tombs of Kertch and of Etruria, in the so-called Picts' houses of Northern Scotland, in the ancient palaces of Yucatan, and in the arcades of the Kootub at Delhi; and is identical in principle with the timber *sanga* with which the Himalayan mountaineers span successfully rivers of more than 100 feet in width.

The cell contains three colossal images, carved in a hard and polished granular volcanic stone probably trachyte. The central one,

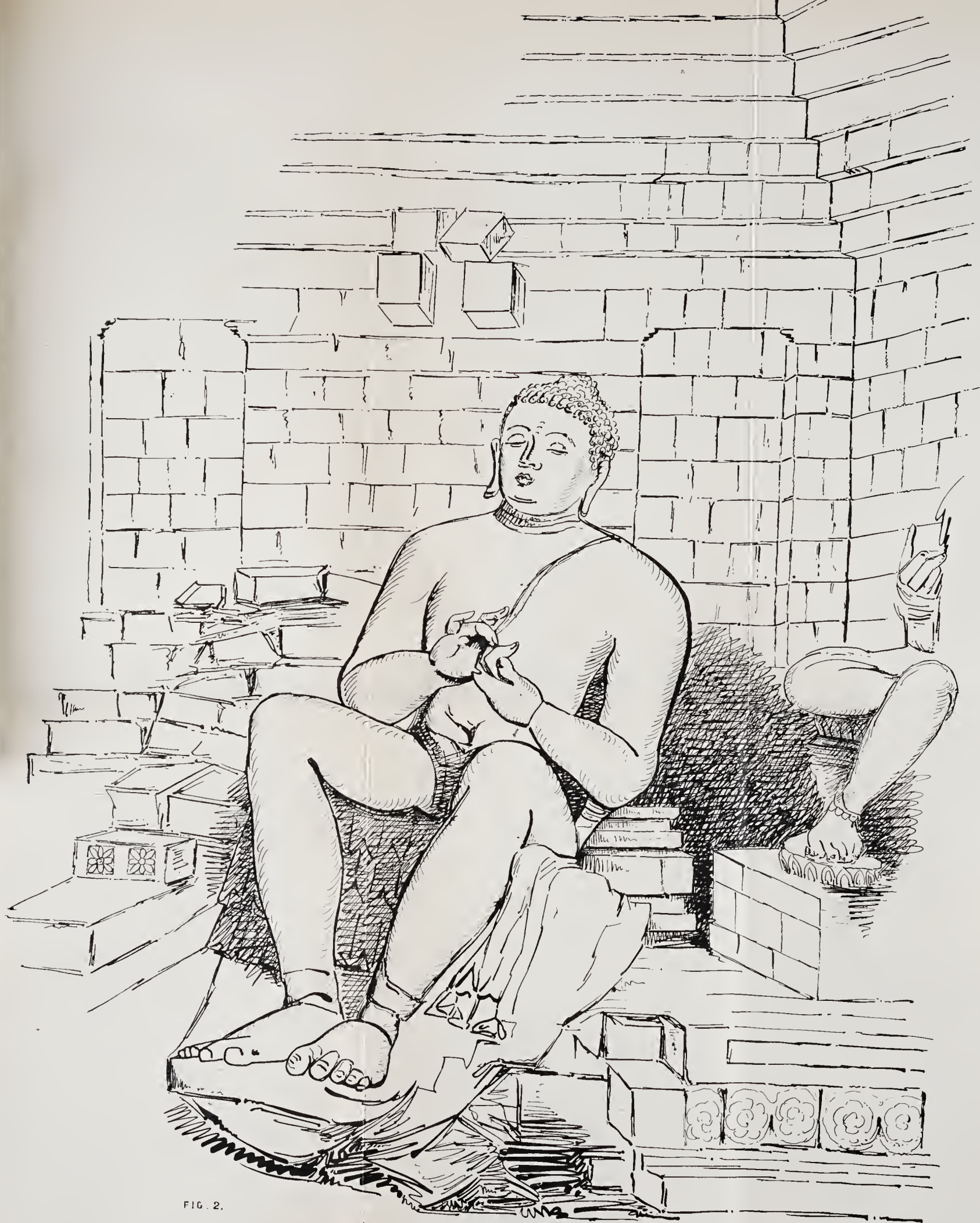


FIG. 2.

GREAT BUDDHA AT MUNDOT.

not less I think than 11 feet in height, is a nearly naked Buddha, exceedingly well sculptured, seated in an attitude of demonstration or teaching *ex cathedrâ* (Fig. 2.) This has originally occupied an elevated place opposite the entrance, but it has fallen and now leans slanting against the wall. On either side sits, still enthroned, a mild-faced male figure of somewhat smaller size, crowned and jewelled, and having the hands also raised as if in conversational action. These did not appear to represent any Hindu gods, and were without monstrosities or emblems.* There are also six highly sculptured niches in the walls, such as usually contain crossed-legged Buddhas, but empty.

There is then, in the interior, nothing inconsistent with pure Buddhism. But the *exterior* on each side is sculptured in relief with figures which are undoubtedly those of Hindu divinities, with their attendants; an 8-armed goddess on one side, Parvati, I believe; 4-armed gods on the other two. The whole contour of the figures, and that peculiar sway of the hips in the standing attendants, which we still see in coarse modern Indian sculpture, is purely Hindu. Parts of the pilasters or styles of the panels containing these reliefs are richly carved in scrolls, not unlike those on the well-known beautiful arcades of the great mosque at the Kootub. There can be little doubt that these reliefs and all the surface ornaments were sculptured *after* the erection of the masonry, as Mr. Crawford has observed in regard to some others of the Javanese temples. I have lately seen this fashion of working very clearly exemplified in the ancient tope of Sarnath near Benares, where you may see the rich ornamentation of the surface in parts left unfinished, and in parts just etched out to guide the carver. But still I think undoubtedly these reliefs must have been part of the original design, and I do not mention the circumstance as elucidating the combination of Brahminism and Buddhism. I believe this mixture is found in some of the caves of western India. In Ceylon the temples of the Hindu divinities are constantly found immediately adjoining the Buddhist pagodas, and though such a combination is totally strange to modern Burma, we found one very old temple at Pagan which exhibited Hindu divinities in panels on the exterior.†

* May they be Dharma and Sanga, the law and the church, the two other objects of Buddhist reverence?

† See a note by Col. Phayre in "Mission to Ava,"—p. 53.

Besides these figures, both the base of the superstructure and the walls of the basement terrace are abundantly sculptured with fantastic subjects. The former is formed into panels of scroll work, the centre of each being a different animal, including the elephant, parrot, braminee goose, stork, deer, buffalo, &c. In the latter, the patterns are alternately of scroll and diaper (See Fig. 3.) The sides of the staircase have been sculptured more rudely with scenes of domestic life, the chase, and other incidents. One of them quaintly represents the old fable of a tortoise carried through the air by two wild geese. In the porch adjoining the entrance, on each side are corresponding groups, one of a man with the brahminical thread, the other of a woman with a child, each surrounded by boys engaged in gathering fruit which others shake down from the trees overhead.

Above these are rows of female figures kneeling towards the shrine, and presenting offerings.

Passing from Mundót about $2\frac{1}{2}$ miles to the N. W. across the river Progo, and noting by the road side a small ancient temple of the same character, which has been caught in the embrace of a large cotton-tree, and is being gradually upheaved by its roots and buttresses, we came in sight of Boro Bodor rising like a half-finished pyramid on the top of a hill about 130 or 140 feet high, and backed by the roots of the great Sumbing, which was itself (alas) invisible, excepting now and then when for a few moments his vast cone peeped forth above the clouds and 11,021 feet above the sea.

A good carriage drive ascends the hill to the base of the building, and passes beyond it to a spacious bungalow or rest-house shaded by a grove of trees. Scattered and fallen sculptured stones and Buddhas have been gathered together and ranged along the avenues of approach. Evidently *now* there is no neglect of this singular and magnificent monument. But no efforts, I fear, can prevent its decay from proceeding with accelerated speed.

It is scarcely possible to find a point of view from which a sketch would give a true idea of this structure, and the best notion of it is to be got from the plates in Raffles and Crawford. Indeed the first near view of Boro Bodor is disappointing. It appears to be far more ruined than it was in the days when Raffles described it, and at first sight it seems little better than a vast and shapeless cairn of stones, with here and there a dome and pinnacle discernible.

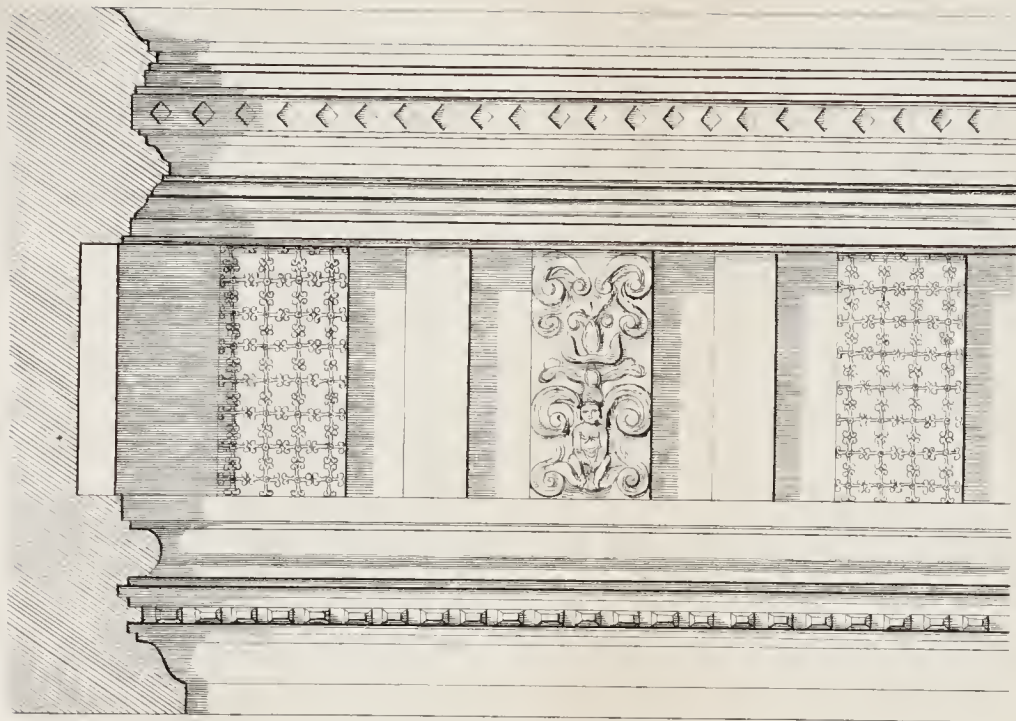
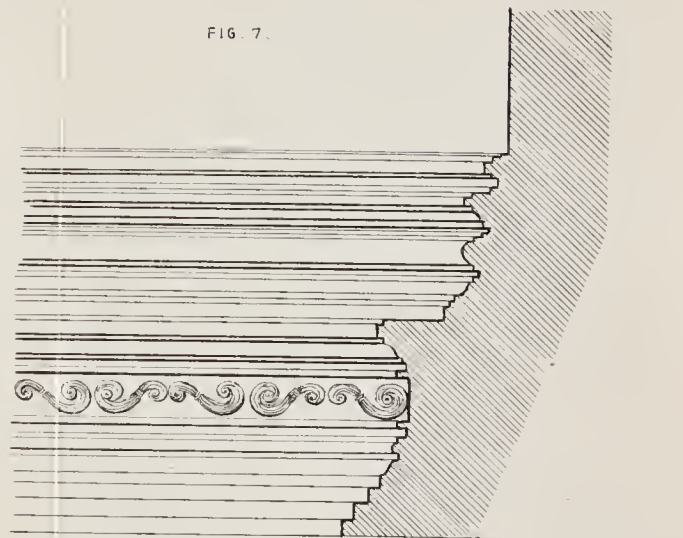


FIG. 3.

BASEMENT AT MUNDOT.

EYE SKETCHES ONLY

FIG. 7.



BASE^T AT KALI-BANENG.

One great paved and elevated terrace, nearly 400 feet* square, forms the platform. Then rise five successive terraces, each surrounded by a high parapet, so as to form between them four corridors running right round the building. Above these come three concentric rings of small dagobas, and in the centre a large dagoba of about 30 feet in diameter, forming the apex and crown of all. The height to the base of this dagoba is about 90 feet.†

In Raffles's time, much of the basement was covered up, and I believe all the galleries had been at one time filled by the volcanic ashes from Mir Api. Raffles must have partially cleared the basement, as he has given elaborate plans of the whole structure, but the complete clearance of the lower platform was carried out by the same Resident Hartman who discovered Mundot.

In the outer face of each terrace are numerous niches crowned by small model dagobas. Each of these niches has been occupied by a cross-legged Buddha,‡ and both sides of the corridors are carved in a vast series of bas-reliefs. These doubtless represent the history of Gautama Buddha, and are analogous to the extensive series of wall paintings often seen in Burma. From Col. Cunningham's descriptions of Sanchi, they appear to have some resemblance to the sculptures there. They exhibit every variety of life, war, worship, processions, and domestic scenes, with an entire absence of any indecency so far as I saw. Courts, chariots, ships, umbrellas, arms, architectural subjects, &c. &c., afford many interesting glimpses of the race which erected these galleries. The faces are all undoubtedly Hindu, and closely resemble those of the best Hindu sculptures. Indeed the faces are not only the best executed, but the best preserved part of the work, and even where the figures are worn and defaced, as one often sees on an old coin, the faces still retain wonderful sharpness and distinctness of character. The Netherlands Government employed artists for several years to make drawings of all these sculptures, and they are now being engraved in Holland at great expense. To photograph them, would be difficult on account of the narrowness of the galleries. The quality of the sculpture, and of

* I take this from Raffles's plan. Crawford says 526 feet and is probably more correct.

† The whole height according to Crawford is 116 feet.

‡ According to Raffles's plan, there must have been 436 of these.

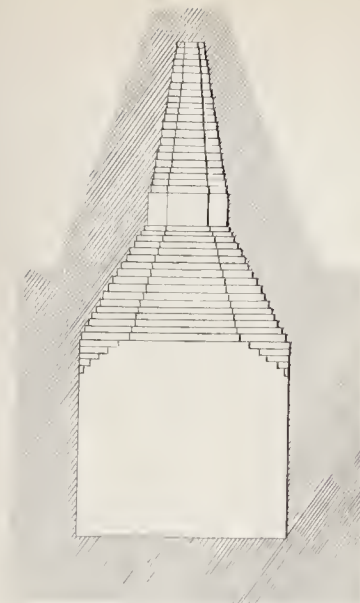
the work generally, appeared to me to fall off towards the top, as if the builders had wearied of their work.

Among the architrave ornaments both here, at Mundót, and at Brambanan, I observed frequent repetitions of the monstrous grinning head, suspending festoons of beads and bells, which is so common in ancient Indian buildings from Assam and Benares to Ceylon, and which is also so common in the ancient Burmese temples at Pagan, probably nearly coeval with Boro Bodor. Mr. Crawford on the authority of an ambassador of the king of Bali, concludes this to represent Siva. But I believe this is utterly unfounded. It is, whatever the symbol may have meant, (if it meant anything more than a lion's head on a Greek entablature,) one of the most ancient forms of ornament in Indian buildings, probably older than the worship of Siva.

The construction of the small dagobas encircling the apex is very peculiar. They are hollow cages or lattices of stone, each containing a patient Buddh immured, who is visible through the diamond-shaped openings in the dome. Each of these openings is formed by the apposition of two hour-glass-shaped stones. Each of the stones has been cut with tenon and mortice attaching it to its neighbours; and an elaborate system of morticing and dove-tailing appears to run through the whole construction, but which has been lamentably insufficient to keep the joints together in that volcanic region, (Figs. 4, 5). The larger dagoba forming the apex is thoroughly shattered, and will not last much longer. It is said to have been first opened by the English in 1812.

Mr. Crawford describes the Boro Bodor as being merely a shell of masonry round a natural nucleus of hill. I had regarded this merely as a conjecture. But we found an excavation that had been made (lately as it seemed) in the interior of the chief dagoba. And this appeared to show that there was no solid nucleus of masonry. The sides of the pit appeared to be a rubble of earth and stone only.

Mr. Fergusson, who gives a good account of the Boro Bodor in his *Handbook of Architecture*, considers it to be a kind of representation of the great Buddhist monasteries, which are described in the Ceylonese writings as having been many stories high, and as containing hundreds of cells for monks. In Tennent's *Ceylon* (Vol. II. p. 588) there is a wood-cut of a singular pyramidal building at Pollanarua,



EYE SKETCH OF
CHANDI KALI BANENG.
(SECTION)
FIG. 12.



FIG. 5.

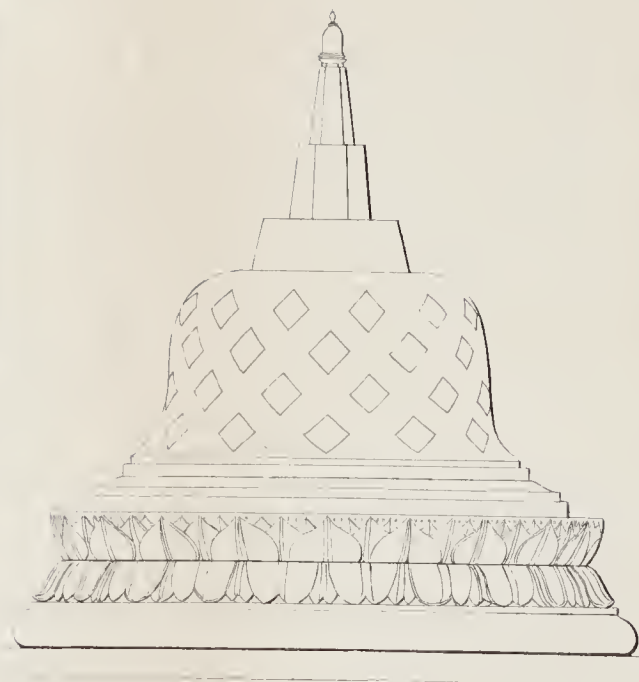
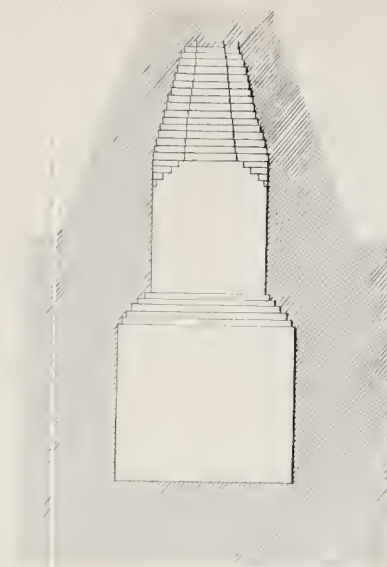


FIG. 4
BORROWED FROM RAFFLES.



EYE SKETCH OF
CHANDI SEWU.
(SECTION)
FIG. 13.

called the *Sat-mahal Prasada* or Seven-storied House, which, in a rough way, is quite analogous to the Boro Bodor.

But the structure nearest to it in general design, that I have seen or heard of, was one visited by Mr. Oldham and me in 1855, at Mengoon above Amarapoora. It was thus described from my journal. "Further north there is an older pagoda of very peculiar character. The basement which formed the bulk of the structure consisted of seven concentric circular terraces, each with a parapet of a curious serpentine form. These parapets rose one above and within the other like the (seven) walls of Ecbatana described by Herodotus. In the parapet of every terrace were at intervals niches looking outwards, in which were figures of nats* and warders in white marble, of half life size. A great circular wall enclosed the whole at some distance from the base. It was difficult to ascertain the nature of the central structure, so shattered was it by the earthquake. The whole (though round instead of square in plan) had a great general resemblance to the large ancient pyramidal temple in Java called Boro Bodor, as described by Raffles and Crawford; but this Mengoon structure was not, I think, very old, and I doubt if the resemblance was more than accidental. At the foot of the hills some hundred yards to the westward there was another pagoda of similar character which we did not visit."†

I retract the notion that the resemblance was purely accidental. It is one of many analogies between Burma and Java in architecture, arts, and manners, of which the history is unknown, though some of them doubtless came from India with the religion which was once common to both. One idea struck me after seeing the Burmese edifice which I will mention. This is, that both it and the Boro Bodor were meant in a way as symbols of the great world-system of the Buddhists, mount Maha Meru surrounded by its seven concentric ranges of mountains. Nor is this inconsistent with Mr. Fergusson's theory of Boro Bodor. There are *seven* stories both in the Burmese edifice and in that of Tennent's Ceylon. At Boro Bodor there are but five galleries with parapets, but there are six terraces now visible, and the plates in Raffles show that there was a seventh and lower terrace which has not been uncovered. As to Boro Bodor

* Burmese devtas or genii.

† Mission to Ava in 1855, p. 172.

being square instead of round that is a trifle! The plate on the table before you will show you that the Tibetan Buddhists *do* represent mount Meru and its seven ridges as *square*.*

The highest of the volcanic mountains of Java, rising to 12,234 feet above the sea bears the name of *Meru* (Sumeru), as the local representative of the apex of the mythical world.

Above the crowning dome the Dutch authorities have erected seats with a small roof to shade visitors, very welcome and useful, however incongruous. We were unfortunate in weather, but the view from the summit must in a clear atmosphere be quite unique. Casting your eyes beyond the grey and shattered domes which hold in durance the eternally meditative Buddhas at your feet, you overlook the whole valley of Kadú with its gentle slopes and terraces. Line behind line, in infinite perspective, lie the dense groves of cocoa-nut and fruit trees which alone indicate the sites of Javanese villages, the intervals being filled up by a garden-like tillage of rice, sugar, indigo, and a vast variety of other crops. Close behind rise the fantastic peaks and cliffs of the calcareous mountains of Menóreh whilst the panorama in front is framed in by the huge peaks of Sumbing and Sindoro, Mir-Babu and Mir-API, respectively 11,021, 10,321, 10,227 and 9,208 English feet in height above the sea.

I will dwell no longer on Boro Bodor, but pass to Brambánan, to which I was unfortunately only able to give a part of a day. It lies close on the borders of the two states of Djokjokarta and Solo, about ten miles from the former capital and immediately south of the noble cone of Mir-API. The remains here are very numerous and interesting, but I will notice only a few points.

The first piece of antiquity that attracts the eye in travelling from Djokjo is a temple in a field close by the road, called by the people "Chandi Kali Baneng;"† *Chandi* being an Indian word which is still applied to all such Hindu remains in Java. This was a beautiful building, and exceedingly interesting to me from its strong resemblance, both in plan and in the details of ornament, to some of the Burmesé temples at Pagán.‡ Like many of these, it was a square

* See Musei Borgiani..... Cosmogonia Indico-Thibetana &c., Romae MDCCXCIII. p. 231. No. 1466 in As. Soc. Library.

† See Fig. 6.

‡ See particularly in Mission to Ava the temple of Senphyokoo. Pl.



CHANDI KALI BAWENG

in plan, with porches on all four sides making it cruciform ; three of these porches forming separate chapels, and the fourth, (that to the east), an entrance. Mr. Oldham will remember that these words describe many of the temples that we have explored together in Burma, most accurately. The lower part, to a height of 7 or 8 feet, was occupied by rich and bold base mouldings, much injured, and above this was the level of the entrance, reached by steps. There were no images remaining within, but on the northern and southern sides were the remains of sculptured standing figures holding lotuses apparently, and over the door of one side was a small figure of Buddha. The exterior faces were adorned with highly decorated niches, each surmounted by the grinning head so often spoken of, and a canopy in relief representing an architectural facade. Above this was a very heavy and rich double cornice in great dilapidation, the lower cornice supported by a frieze of little human figures, Atlas-like, bearing it on their hands. The interior was a chamber of about 26 feet square roofed in by the usual false vault in the way shown in the section ;* there were here traces of a fine coat of plaster which evidently had at one time covered the whole of the building, and was found even on some of those points which were most richly sculptured, such as the fine scroll work on the pilasters at the angles. This is a very singular feature, and I have little doubt that it was universal in these buildings. The use of lime is entirely rejected as a cement in the joints of the building, but adopted as a coating to the most elaborate surfaces of stone-work. Exactly the same was the case at Pagán, only admirable brick-work was there substituted for stone. If the object was the preservation of the building, it is difficult to understand why the stones should not have been laid with mortar. We know that even the sculptured cave-walls of Ellora and Ajunta have been similarly coated with plaster, and that there it was to give a ground for colouring. Probably the object here was the same.

* Fig. 12. There is, I find, a description of this temple, with a plan and section in Raffles, but no view. It is by Captain G. Baker whom Raffles employed to draw and survey the remains, and I may mention that he seems to have accepted all the ignorant talk of the sepoys who were with him as authoritative, and consequently has misleading descriptions of the figures as representing Krishna, Sita, &c. The figure which he calls Sita appears to be the small Buddha over the door ; and the whole building appears to have been purely Buddhist.

The principal group of temples at Brambanan is or has been that of Loro Jongran. They are so utterly ruined that, even when very near them, you scarcely make out anything but great cairns of stones heaped together. It must have been a tremendous earthquake that produced such ruin. Closer examination shows among the chaos many fragments of rich mouldings and sculpture, and some of the basements, highly adorned with vases and festoons, are tolerably perfect. The largest pyramid of ruin you ascend to a height of some five and thirty feet, and find entrances to cells opening to the four cardinal points. The most remarkable circumstance about this ruin is that three of those cells contain very fine and purely Hindu figures. That to the north is an eight-armed goddess standing triumphantly on a dead buffalo and grasping in one of her four left arms the curly wig of a little monster. It is evidently the same subject that is represented in Moor's Hindu Pantheon, plate 35, and therein entitled "Durga or active Virtue slaying Maheshásura or Vice personified." This is the figure called by the Javanese Loro Jongran, and giving its name to the temple. It appears to be common among Javan remains, as you will find half a dozen in the plates to Raffles. To the west is Ganesha with his elephant head; and to the south a fine Jupiter-like bearded Siva with the trident.* The fourth entrance was obstructed by fallen stone, and I was too tired to attempt to crawl in. It is to the east, and probably was the entrance to a central chamber. From the height at which these cells stand they must evidently have formed an upper story of the temple. They are carved on great slabs standing against the wall without being attached to it, and I have some doubts if they are the original occupants. The cells otherwise seem exactly parallel to those of the cruciform Buddhist temples already described, and to which class nearly all the other Brambánan temples appear to belong. These are, however, the most ancient, as we may guess from their utter ruin. The other and more perfect temples cannot have been standing when the tremendous earthquake occurred which rattled these down into such a chaos. They may therefore have been the remains of a more ancient Brahminical sanctuary, as we know from the travels of Fahian that in his time (the beginning of the 5th century) Brahmins existed in

* There is an engraving of this in Crawford. *Indian Arch.* II. pl. 27.

Java, but Buddhism did not.* I do not take up more time with these, as there is a full description of them inserted in Raffles.

The only other group of temples that I will notice is that called *Chandi Sewu*, or the Thousand Temples, also described in Raffles. The group consists of one large central cruciform temple, as usual, with three blind porches and a fourth on the east giving access to the interior. But this is surrounded by four successive squares of small cells or temples, the outer square of which is upwards of 500 feet in the side. Many of these small cells are obliterated, and without more time than I had it would be difficult to say accurately their original number. A plan however is given in Raffles, which shows that the inner square has 8 temples to the side, the next has 12, and the two outer squares 20 and 22 respectively. I note this, because I suppose its accuracy may be assumed, and because its discrepancy from my own notes shows how apt a hurried notice in such matters is to err, even when there is a desire to be accurate.† My notes mention only 3 squares, containing respectively 8, 12 and 24 temples to the side, and I took some pains to allow correctly, by pacing, for the intervals where numerous temples were obliterated. However, I am amused to find that a man who probably had no such plea of haste as I, and is an observer by profession, Dr. F. Junghuhn, the author of the chief physical account of Java, in a paper on the same subject as my own, declares that there are 176 in the 4 squares, respectively 28, 36, 52, and 60. The whole number will be, according to Raffles's plan, in the four squares 240, besides four pairs placed intermediately between the 2d and 3d squares and flanking the avenues of approach.

The central temple is greatly shattered, and the image (a great Buddha I doubt not‡) which it contained, is gone. It stands with its porches on a terrace slightly elevated. There are no figures

* "On fut ainsi pendant quatre-vingt-dix jours ; alors on arriva à un royaume nommé *Yepho-thi*. Les hérétiques et les Brahmanes y sont en grand nombre, il n'y est pas question de la loi de Foe."—*Relation des Royaumes Bouddhiques*, 360.

† I may apologize for such inaccuracy by the fact that I was only recovering from a long illness, and was incapable of exertion in a hot sun.

‡ What Crawford says in speaking of this is misleading: "Each of the smaller temples had contained a figure of Buddha, and the great central one, consisting of several apartments, figures of the principal objects of worship, which, in every case that I have had an opportunity of examining, have consisted of the destroying power of the Hindu triad or some of his family." The central temple of Chandi Sewu was empty then as it is now, and this merely states* a foregone (and I believe quite mistaken) conclusion.

* Indian Archipelago, II. 196.

sculptured upon it, the decorations apparently having been panels of diaper work chiefly. I give a sketch of the beautifully executed doorway, chiefly on account of the singular ornament at the lower angle of the door-frame, representing what I must call for shortness an arabesque sea monster, and exactly similar to a constant ornament over the openings of the great Pagán temples on the Irawadi. (See Fig. 8). It is found also in Southern India. The small cells or chapels are each about 10 or 11 feet square. Their walls are carved with mythological figures in bas-relief, and each has been crowned by a small dagoba of the genuine Buddhist pattern. They all open outward, except the 3d row which stands back to back with the outer row,* and each has contained a cross-legged Buddha, of which some remain. There are groups of modern temples about Calcutta and Burdwan, somewhat similar in general arrangement. Mr. Fergusson appears to doubt whether he should not class this as a Jain temple.

I know little about Jains, but will answer for it that any Burmese would find himself at home in it as a monument of unmistakeable Buddhism.

Guarding the outer end of the avenue, by which we approached, are two gigantic warders, standing or rather kneeling, about 9 feet in height, with club grasped in the right hand, and a snake which twists round the body grasped in the left, with crisped hair and great staring eyeballs; also closely resembling the similar figures in marble and in stucco which are so common in Burma. (Fig. 9.)

The central temple is apparently that which is represented in the plates to Raffles† as the “Great Temple at Brambanan,” whilst one of the cells is represented,‡ as “one of the smaller temples at Brambanan.” It strikes me, however, that they are both very inaccurate, and the elaborate restoration of the great temple which is given in Pl. 40 is, I have no hesitation in saying, preposterously improbable.

In conclusion, as it is a point of some interest, I may note that Mr. Crawford says,§ that, though the interior vault of the temples is a false one, “the builders of Brambanan had possessed the art of turning an elliptical arch and vault, for the entrances or doorways are all arched, and the roofs all vaulted.” I think this is another instance

* This from Raffles's plate.

† 2d edition, Pl. 39.

‡ Pl. 41.

§ History of Indian Archipelago, II. 196.

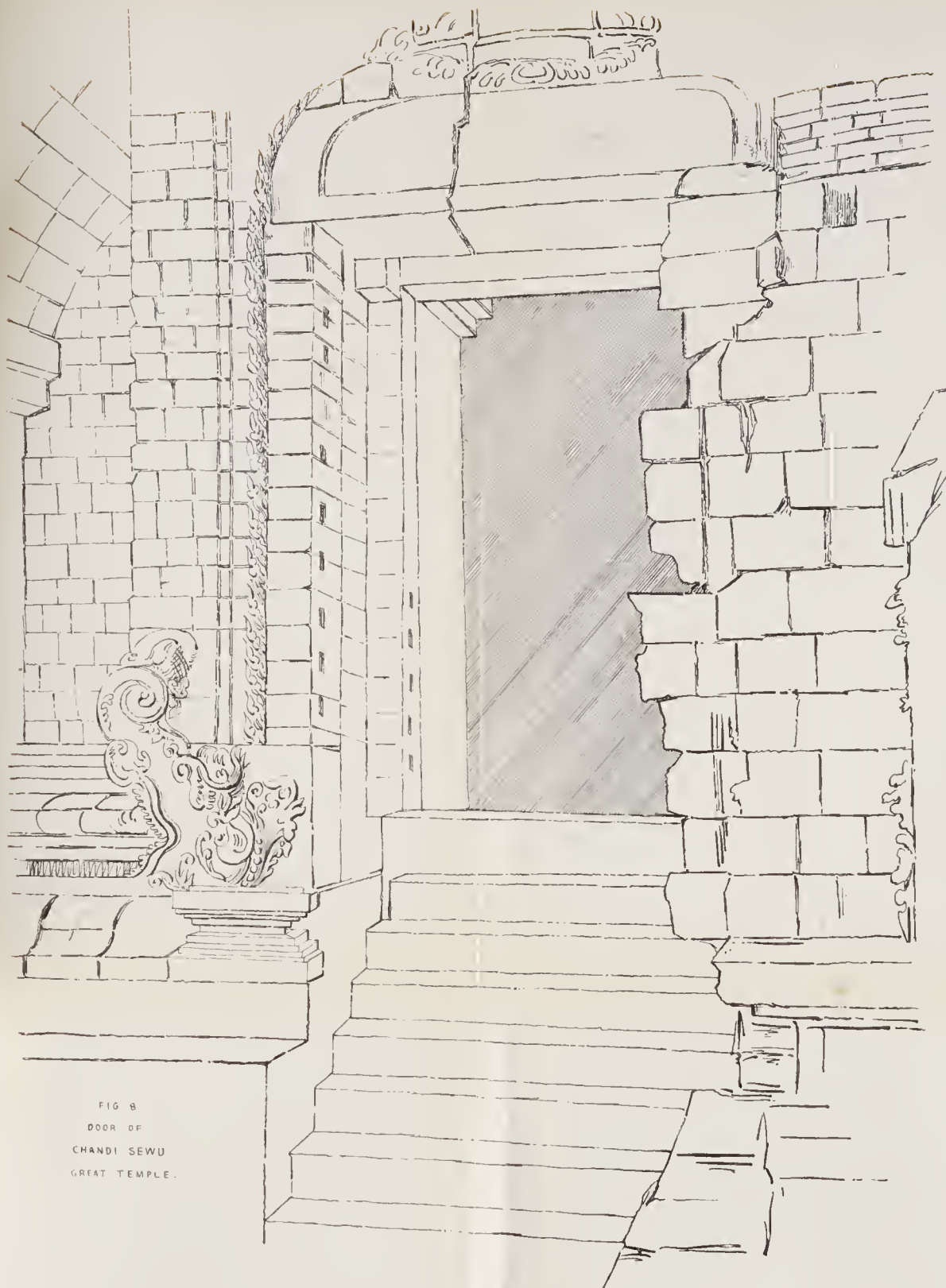


FIG 8
DOOR OF
CHANDI SEWU
GREAT TEMPLE.



FIG. 9.

COLOSSAL WARDER

AT CHANDI SEWU.

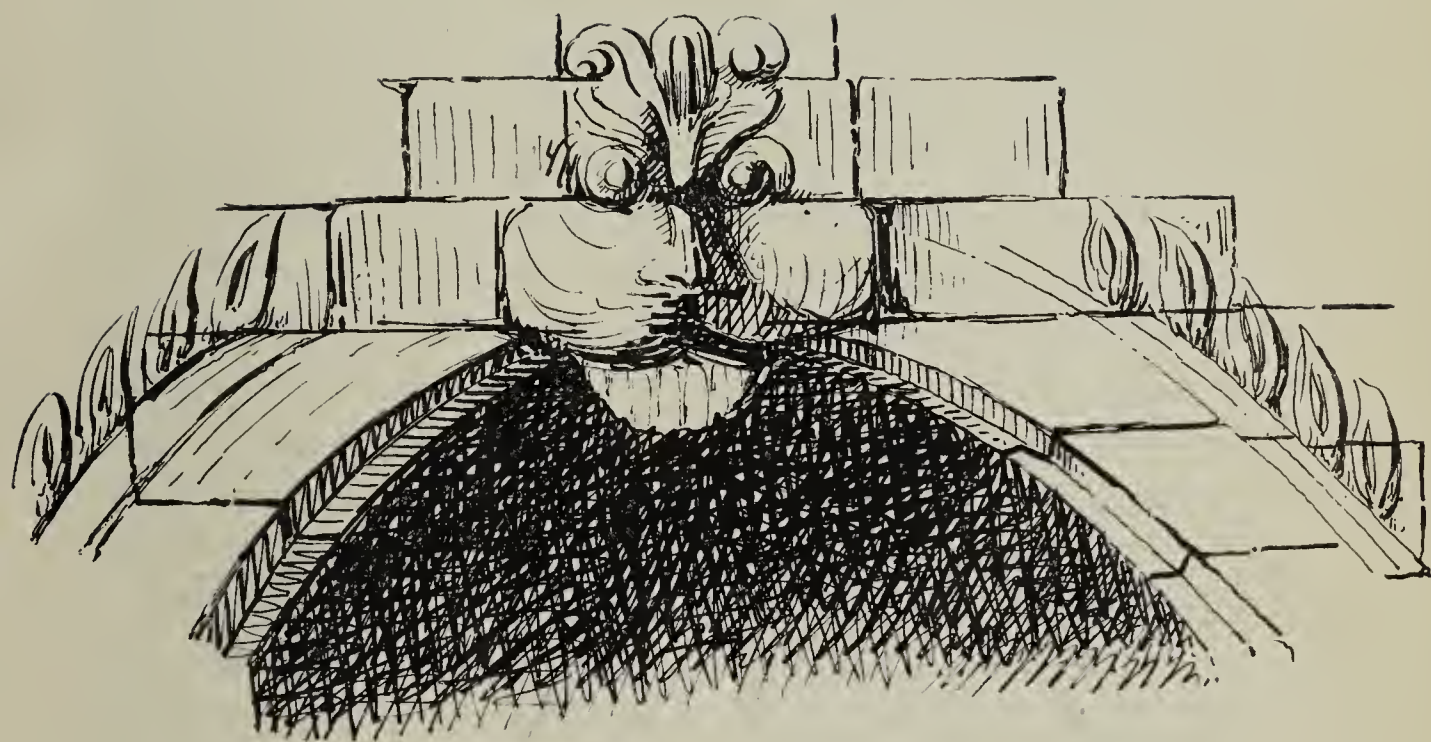


FIG. 10.



FIG. 11.

of incorrect observation in a man of distinguished sagacity and general accuracy. I certainly know that it is a mistake to say *all*, for not one arch or vault properly so-called could I discover in the temples we visited. All were formed on the same *corbelling* principle that I have already spoken of, and I suspect that there *are* none otherwise formed. The nearest approach to such a construction that I saw was in the very curious two-storied building of which Raffles (Pl. 29) gives an indifferent plate, but which I will not take up your time in describing. In some of the apertures of this, there is a sort of sham key-stone found, but it is only a sham, for it really rests on corbelled projections (See Figs. 10, and 11.) Exactly the same approach to the arch is to be seen in the arcades about the Kootub, as if the builders had heard an arch described, or had seen one, but could not remember how to imitate it. This may be seen very plainly in Mr. Beato's well-known photographs of the Delhi remains.

In conclusion, it may be asked, what is the object of this paper? as, with the exception of the temple at Mundót, most of the particulars must have been given by previous English writers. Well, here is an object.

In a paper which the greatest living authority on Buddhist, and on all ancient Indian architecture, Mr. Fergusson, was kind enough to attach to my description of the temples at Pagán on the Irawadi, he pointed out that that account opened a new chapter in our knowledge of Buddhist architecture. In India Buddhist remains take either the form of the Tope, of the Chaitya Hall (as he calls it) or basilica, or of the Vihára or monastery. But purely *image temples* were not known, unless you went so far north as Cashmere and the Salt Range of the Punjab; and the Buddhist character of these was doubted from the very fact of their being such mere *temples*. The Pagán buildings were such, and there could be no question about *their* Buddhism. Now, here in Java we have exactly similar temples, and I believe those which I have described, except perhaps the ruined piles of Loro Jongran, as certainly and unmistakeably Buddhist. But not only so. The general characters also of those temples, in Java and in Burma, have a close resemblance as well as the detail of their ornaments. The ornaments of both are of Indian origin; the form and style of both are as near as could be* in the difference of

* With certain remarkable exceptions.

material, one of brick stuccoed, the other of stone elaborately wrought. And yet of this form we find no type any where in India that I know of; the nearest being those Cashmere temples, but altogether different in their style and ornamentation.* They *must* have had a common original. Where was it? It is impossible to suppose that Buddhists in India were familiar with certain styles of building, and when emigrating, or driven forth, to two very different quarters of the further East, developed a new style and that substantially the same in each case. The natural and general belief is that the emigrations from India to Java took place from the coast of Kalinga and Orissa, and the name of Kling, given by the Malays to the Indians among them, confirms this notion. But there is no resemblance whatever in the plan of these edifices to the great temples of that coast, such as Bhobaneswar, Juggurnath and Kanarak. Raffles has a tradition of connexion with Guzerat; and it is possible that in Western India the original type may be found. I have never seen any drawing of the temple of Somnath except a very coarse one in the Society's Journal, and in that there are some remarkable traces distinguishable of the same style. I am not able to go a step in solving the problem, but I think I show that there is a problem to solve—if there were but anybody now-a-days among us who cared about such problems!†

P. S.—Though the matter has no relation to the subject of the preceding paper except as being connected with Java, it may be interesting, with reference to the late discoveries of stone celts in Central India, which formed the subject of a communication from Mr. H. P. Lemesurier some time ago, to mention a very fine collection of celts which I saw in Java.

The possessor was Mr. Kinder Van Camarecq, the Resident of the province of Bagelén, in the south of the Island. His collection of stone weapons numbered some 200 specimens, found in all parts of

* The general period of the Javanese Buddhist temples as stated by Crawford (Brambanan 1266-1296; Boro Bodor 1338) is not very different from that of the great temples at Pagán (1066-1200).

† The roughness of the drawings supplied in illustration of this paper requires apology. I have had to prepare them under a great pressure of other work, in winding up my Indian service, and amid the duties of a laborious office.

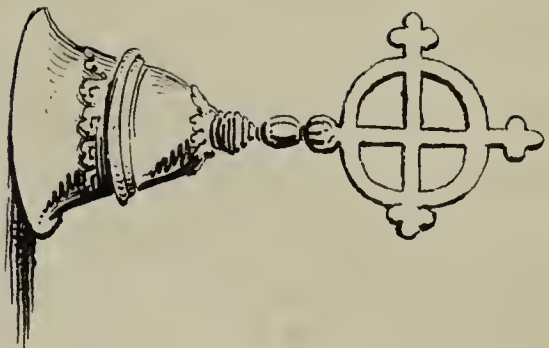


FIG. 15.

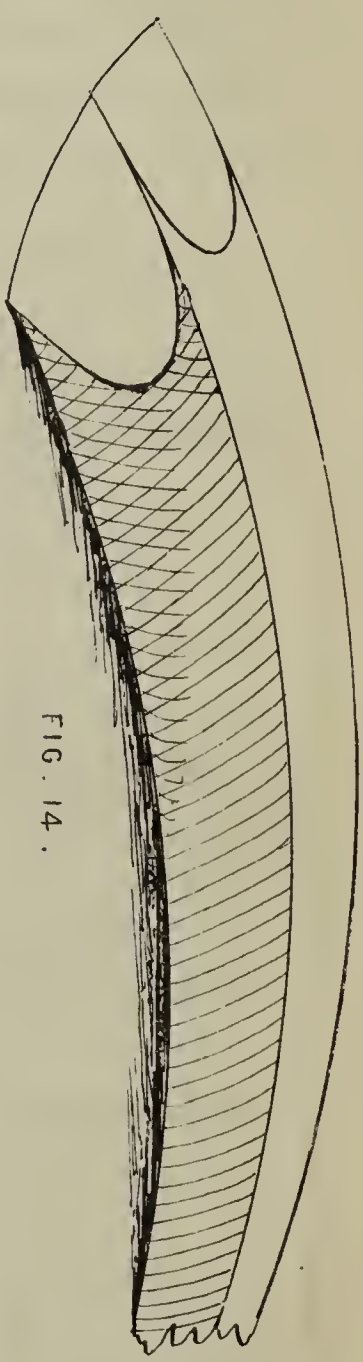


FIG. 14.

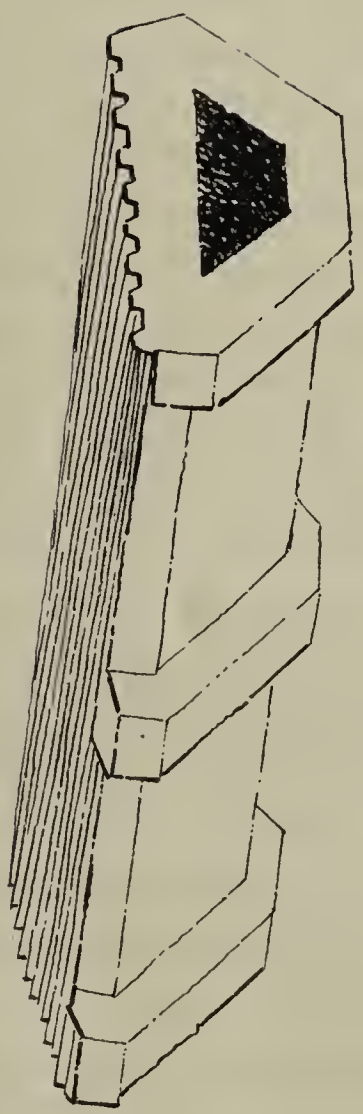
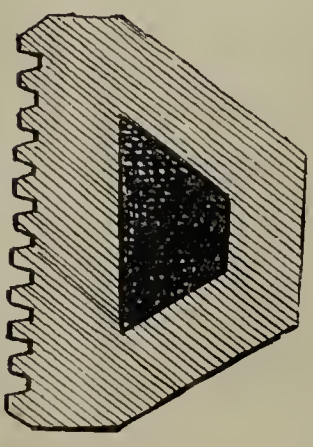


FIG. 16.



SECTION

LITH: BY H.M. SMITH, SURVEYOR GENERAL'S OFFICE, CALCUTTA, JANUARY, 1862.




the Island, but chiefly in the west. They far surpassed anything I have seen in my limited experience. Some of the hatchet-like weapons were fully ten inches long, beautifully finished and polished. There were also examples of spear-heads and axes in an unfinished state, roughed out with conchoidal fractures, very like the representations of those articles which have lately made such a stir in Europe, as bearing on the antiquity of man. The most curious was the weapon represented (in Fig. 14) of which there were several examples beautifully finished, even the lines marking the bevil on each side being curves of perfect symmetry. The use of this weapon is a problem, as well as the question how a people ignorant of metal tools could arrive at such perfect workmanship.

It is worth mentioning that in every instance the back end of the weapon was left rough and unwrought.

Mr. Kinder Van Camarecq's collection contained many bronzes and other objects of the greatest interest, and some specimens of wretched forgeries of bronzes at which the Javanese try their hands to take in strangers. I will only mention two of the articles in his collection besides the celts. One was a small bell decorated in the usual Buddhist style, but the handle of which by some strange chance was formed into a genuine Iona cross.* The other was a very curious implement of some white metal, the use of which is unknown. It is shown in Fig. 16. It is 5 or 6 inches long, perforated throughout, and the bottom furrowed from end to end by parallel grooves. The natives have no idea of its use, but it is said to have some distant resemblance to a tool used in Java to polish the paper of the country.

* I regret that I have lost my sketch of this curious bell. That given in Fig. 15 is from recollection.



*The Trigonometrical Survey of India, (Communicated by Major
J. T. WALKER.)*

The following is the first of a Series of papers on matters of general interest connected with the Trigonometrical Survey of India, which it is proposed to extract from the manuscript volumes of the Survey, for publication in the Journal of the Asiatic Society. It is taken from the Introduction to the General Report of the North-East Longitudinal Series of triangles (G. T. Survey, Vol. XV.) drawn up under the Superintendence of Col. Sir Andrew Waugh, when Surveyor General of India, by J. B. N. Hennessey, Esq., 1st Assistant G. T. Survey.

The North-East Longitudinal Series derives its name from the circumstance of its following the course of the corresponding boundary of British India. It extends from the valley of the Dchra Dhoon to Purneah, connecting the northern extremities of the Calcutta Meridional Series and the celebrated Great Arc, measured by Cols. Lambton and Everest, on the meridian of Cape Comorin. Its object was to form the most direct connexion practicable between two base lines of verification, one measured in Dchra Dhoon, the other in Purneah. Thus it serves to close and verify the Meridional Series, 10 in number, which lie between the Great Arc and Calcutta Meridional Series and emanate from the longitudinal triangulation, connecting the Calcutta base with the Seronj base on the Great Arc in Central India.

This is the general system followed in the triangulation of India, which thus resembles in outline the form of a gridiron. At each angle of the gridiron, a base line is measured. The outer series form the frame-work on which the inner ones depend, and are especially valuable for the data they contribute towards the determination of the great problem of geodesy, the accurate measurement of the figure of the earth. By restricting the meridional, or inner series, to distances of 60 to 100 miles apart, all the necessary data for topographical operations are obtained, at a moiety of the cost that would be incurred in throwing a net work of triangles over the whole of India after the manner of European surveys, which require greater detail than is necessary in this country.

The North East Longitudinal Series was originally intended by Col. now Sir George Everest, C. B. to have been carried along the mountains on the British frontier. But this design was abandoned in consequence of the refusal of the Nepalese Government to allow the operations to enter their territories. Consequently, after crossing the hills of Kumaon and Gurhwal, the triangles were brought down into the Terai near Bareilly, from which point they lie almost continuously in the marshy and deadly tracts which fringe the Himalaya mountains. Here Lt. Reginald Walker, a very able and promising young officer, fell a victim to jungle fever. Being alone and without medical assistance, he strove to reach Darjeeling, but was found dead in his dhooly, on its arrival at that station. Of the native subordinates, a large percentage, one year no less than a fourth, died of jungle fever. Sickness was frequent and severe. On more than one occasion a whole party had to be literally carried into the nearest station for medical assistance. The completion of the major, and more difficult portion of the triangulation is due to the ability, courage and perseverance displayed by Mr. George Logan, who died three years afterwards, from disease first contracted in the Terai during these operations.

Owing to the proximity of the triangulation to the mountain ranges, the whole of the chief peaks were seen from the principal trigonometrical stations, and fixed by measurements with the first class instruments employed for the mutual observations between the stations themselves. These are called the "Principal Observations," for on them, the accuracy and value of the series, as a whole, depend. They are therefore taken with the largest and most powerful theodolites, which are expressly constructed for the Indian Survey, and furnished with micrometer microscopes, instead of verniers, for reading the graduations.

The employment of such instruments in secondary operations has the advantage of enabling the observer to attain as great accuracy by a few observations as by many with second class instruments; thus time is saved and reliable measurements of the higher mountains can be taken during the short intervals when their usually cloud-capped summits are unfurled to view.

The following extracts are chiefly relative to the computations for determining the heights and positions of the principal mountains.

A table of the resulting elements is given, together with a memorandum specifying the mountains which could be identified as having been previously observed by other surveyors. J. T. W.

Of the Secondary Mountain Triangulation.

57. The magnitude of the triangles for determining the positions of the hill peaks, and other unavoidable peculiarities attendant on the operations in general, have necessitated some few departures from ordinary precedents in the performance of the required calculations. These may be briefly noticed.

58. *Identification.*—The primary difficulty which the computer meets with is, in the identification of the numerous points whose positions have been determined. Observed by different persons, after long intervals or from different points of view under the disadvantages of altered aspects, the same hill will be found noted in the angle books under various characteristics. For instance, Mont Everest was called *v* by Colonel Waugh, *n* by Mr. Nicolson and *b* by Mr. Armstrong, while the peak XXXVIII. is named n^2 at one station of observation, n^3 at another and “I west peak” at a third, by the same observer. This plurality of characteristics, under the circumstances, is clearly unavoidable. It remains to state how the required identification was effected. The principal series was first carefully projected on a scale of 4 miles to the inch, and the several rays emanating from stations of observation were next exactly drawn. The intersection of these rays, assisted by the characteristics forthcoming in the angle books, more or less distinctly defined the points sought for. This was treated as an approximate identification, whereby the bases required from the principal series and experimental triangles to be computed became known. The former were then obtained in the ordinary way, by means of the contained angle and logfeet of the including sides, for which computation the following well known formula was found useful,

$$\tan \frac{1}{2} (A - B) = \tan (45 - Q) \cot \frac{C}{2}$$

$$\text{wherein } \tan Q = \frac{b}{a}$$

With the bases so found, the triangles were, as implied, first experimentally computed, an accordance of the numerous common sides demonstrating an identity of the several characteristic letters. In those cases where any want of demonstration existed, the point was rejected.

59. Such identification imposes no *experimental* calculation when the points observed are clearly isolated from each other. For instance XI. or Jannoo, XIII. and Mont Everest or XV. were readily identified by the angular projection. But as in the cases of XLIII., XLIV. and XLV. it is evident that nothing short of actual computation will separate the points in the group. The numerous experimental triangles by which non-identity was proved, as also the triangles for bases are not shown in this volume. The last mentioned triangles were about 450 in number, and the former also involved considerable labour.

60. *Spheroidal excess*.—The two formulæ for spheroidal excess, viz., that involving two sides and the contained angle, and the other in terms of the base and the three angles, were respectively employed in the triangles for bases and in those to Himalayan points. In the latter case however, the spherical angle opposite the base c could, in the first instance, be only roughly found from the equation $\pi - (A + B) = C$, wherein A and B are spherical angles. Whence C was taken too small by the whole spheroidal excess. Now, as this latter frequently exceeds 100 seconds, it was sometimes required to find the excess approximately, next to correct the angle C , and then with this value of C , to recompute the excess finally. In other respects the Triangles were calculated as usually done.

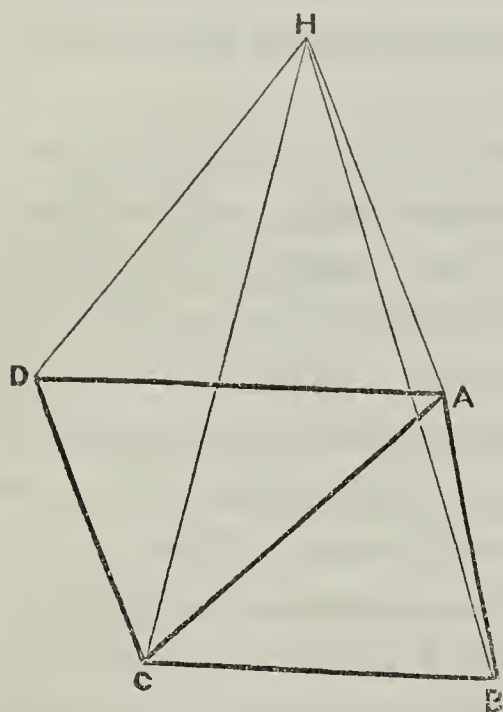
61. *Synopsis of sides*.—The values of the sides in feet thus obtained were recorded in the form of a synopsis, and this paper was completed by finding the logarithm to the mean of these values, as well as the miles corresponding to the same.

62. *Latitude and Longitude*.—The computer was now prepared to deduce the required latitudes and longitudes, which was done in this wise. With the latitude and longitude of any station of observation A , the azimuth thereat of point n , and the mean distance from the synopsis of sides A to n , the latitude and longitude of n from A were found. Similarly values of latitude and longitude were obtained from the other stations of observation, and a mean of all these values was taken as *the* latitude and longitude of n .

63. The computation of heights was performed in the usual manner, until the estimation of terrestrial refraction was arrived at. The process adopted for this purpose may be briefly stated thus.

64. *Estimation of Terrestrial Refraction.*—If the contained arc be represented by c , and terrestrial refraction by r , then $\frac{r}{c} = f$

the factor, or “decimals of contained arc.” Whereby if f be given, then $r = c.f$ may be computed. From want of a more accurate method of determination, it is usual to adopt that mean value of f , for finding the height of an inaccessible point, which may be forthcoming from the reciprocal observations at visited stations. For instance if A, B, C, D, be points of the last mentioned order, then

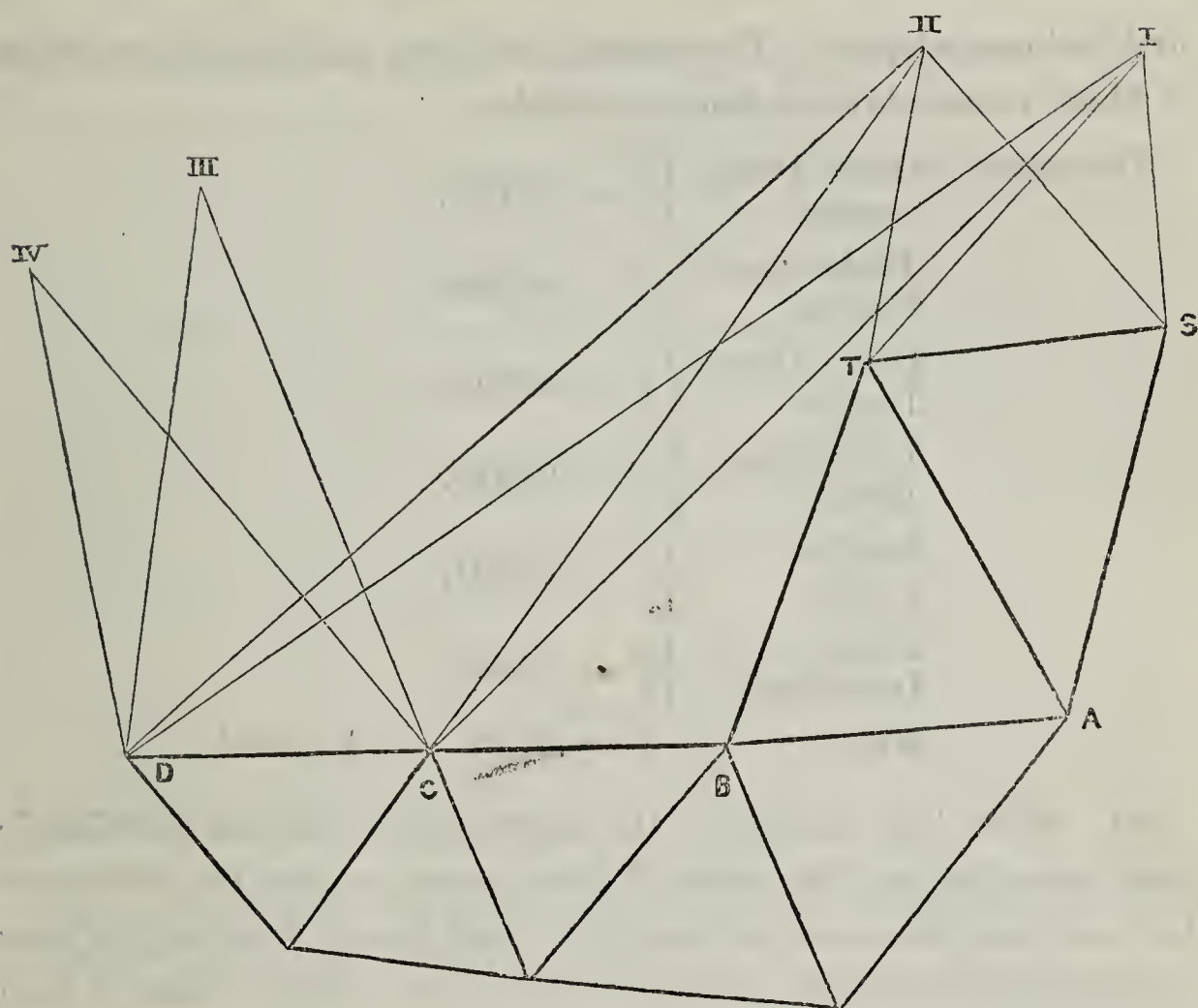


in the ordinary course of computation, there will result three values of f at A, as many at C, and two values each at B and D. The mean value of f at each station would therefore be adopted in computing the height of an inaccessible point H. To take a real case (at random). The values of f at Batwya T. S. (1) are $+ 0.011$, $- 0.017$, $+ 0.065$ and $+ 0.013$. Wherein the greatest difference is no less than .082 of the contained arc. On the other hand, the values of f at hill stations of observation, will always be

found accordant within far smaller limits.

65. The conclusion drawn from the foregoing is evidently this. That at plain stations, and when the object observed is placed on an ordinary tower, the value of f determined from any given ray A B, is not necessarily applicable to any other ray A C. Whereas all rays of light at hill stations from terrestrial points appear to be nearly equally refracted. These phenomena are clearly traceable to local causes.

66. But of the two mean values of f , one obtained at a mountain station of observation, and another deduced in the plains, it is evident that the former is more trustworthy, and hence it appeared desirable, that the latter should be obtained in terms of the former.



67. *Process of estimating terrestrial refraction.*—Let A, B, C, D, (vide figure) be plain stations, T and S stations on the Sub-Himalayas, and I. to IV. inaccessible points on the range of perpetual snows. Let the values of f at T and S equal respectively f and f_s . We may deduce from these, two trustworthy values of the heights of I. and II. Calling this mean height of I $= I_m$, and remembering that we have elevation (E) at C of I, as also the contained arc for C I $= (c)$ given, it is clear that the values of f at C, corresponding to I_m may be found. Let this value $= f$. Proceeding in the same manner we shall find $f_c = \frac{f^1 + f^2 + \dots + f_n}{n}$

Similarly f_D &c., may be obtained, and with f_c , f_D &c., may be computed III_m , IV_m &c., from which again in turn may be found the values of f for the other plain stations from which III, IV &c., have been observed. By this process the computed values of f are determined nearly in terms of f_t and f_s , errors of observation not being taken into account. It remains to mention how f_s and f_t were obtained.

68. The computations originate from Senchal and Tonglo hill stations, at which stations, the following mean value of f was in the

first instance adopted. The selection has been made to the exclusion of those values obtained from short sides.

Deduction.—Doom Dangi	}	$f = .07617.$
Senehal		
Thakoorganj	}	$f = .07636.$
Senehal		
Doom Dangi	}	$f = .07915.$
Tonglo		
Thakoorganj	}	$f = .07849.$
Tonglo		
Senehal	}	$f = .06201.$
Tonglo		
Tonglo	}	$f = .08043.$
Darjeeling		
Mean		$f = .0744. = \frac{1}{13.2}$ nearly.

69. With this value of f , the heights from Senehal and Tonglo were computed, and the mean of these values, as also the differences between each value and its mean, were next found. The heights were now corrected, in such wise, that when the heights deduced from Senehal are compared with the mean heights already mentioned, the greatest $+$ and $-$ differences should be numerically equal. The same process being gone through at Tonglo, H. S., there resulted the mean values of f , which have been employed for that station and for Senehal. These values will be found recorded in the heights herein given, and it will also be found, that they have been employed for all heights of the *Sub-Himalayas* observed at Senehal and Tonglo hill stations.

70. It may be useful to remember, that if there be two points A and B observed from O, whose heights respectively are h_a and h_b determined by a certain value of f at $O = f_o$. Also if d_a equal corrected geodetic distance O to A, and $d_b = O$ B. Then if f_o vary, so that h_a (the height of A computed from O) changes by $\pm \delta_a$, and h_b by $\pm \delta_b$, so will $\pm \frac{\delta_b}{\delta_a} \propto \frac{d_b^2}{d_a^2}$. Hence should the foregoing method for finding the value of f at plain stations in terms of the observed value at hill stations, be hereafter ever adopted, it will be found advantageous to construct a table of the squares of the distances in miles, for this purpose.

71. The general principle of procedure is now apparent. But as

will be remarked, the process described is only applicable so long as a continuous connection is preserved, between the stations of observation and the points observed. In the observations under consideration, there occurs a blank space between points LII. and LIII whence the method described was no longer applicable beyond the former point. But it fortunately happens that LIII. and succeeding points are observed from hill stations, whereat, as already mentioned, the values of *f* are liable to but trifling variation. The mean value of *f* in these cases was deduced in the ordinary way as mentioned at para. 64. The following is an example of this method.

At Jagesar, H. S. the values of

(*f*) are { .04485.
 .04528.
 .04876.

Mean *f* adopted at Jagesar, H. S. .04630.

72. *Values of f tabulated.*—The values of *f* employed in these calculations may be tabulated thus.

Height above sea level.	Names of Stations.					<i>f</i> .	Denominator of vulgar frac- tion.
Feet.							
8610	Senchal, H. S.	...	...	..		.0815	12.2657
319	Doom Dangi, T. S.	...	...	...		.0744	13.4374
7169	Darjeeling, H. S.	...	...	..		.0885	11.2945
6884	Birch Hill, S.	...	...	...		.0864	11.5737
273	Thakoorganj, T. S.	...	...	..		.0775	12.9066
10084	Tonglo, H. S.	...	...	...		.0711	14.0550
251	Banderjoola, T. S.	...	...	...		.0811	12.3317
237	Menai, T. S.	...	...	...		.0753	13.2852
242	Baisi, T. S.	...	...	...		.0743	13.4677
226	Harpoor, T. S.	...	...	..		.0727	13.7637
242	Ladnia, T. S.	...	..	...		.0746	13.4025
263	Janjpati, T. S.	...	...	...		.0731	13.6705
254	Mirzapoor, T. S.	...	...	..		.0736	13.5775
231	Jirol, T. S.	...	...	...		.0735	13.6008
282	Sinereah, T. S.	...	...	...		.0753	13.2797
268	Boolakipoor, T. S.	...	...	...		.0728	13.7429
259	Batwya, T. S.	...	...	...		.0714	14.0093
320	Torharwa, T. S.	...	...	...		.0847	11.8002
357	Morairi, T. S.	...	...	...		.0791	12.6429
353	Soopoor, T. S.	...	...	...		.0813	12.3031
355	Banarsi, T. S.	...	...	...		.0937	10.6681
344	Saonbarsa, T. S.	...	...	...		.0870	11.4928
350	Bharmi, T. S.	...	...	...		.0787	12.7054
329	Poorena, T. S.	...	...	...		.0805	12.4154
358	Ghaos, T. S.	...	...	...		.0875	11.4292

Height above sea level.	Names of Stations.				<i>f</i> .	Denominator of vulgar frac- tion.
412	Toolsipoor, T. S.	...	...	...	.0763	13.1058
478	Anarkali, T. S.	...	...	...	.0744	13.4432
7732	Jagesar, H. S.	...	...	...	.0463	21.5983
6994	Birond, H. S.	...	...	...	.0652	15.3374
10101	Khankra, H. S.	...	...	...	.0579	17.2652
8526	Soonchalia, H. S.	...	...	...	.0624	16.0256
6946	Ghoongti, H. S.	...	...	...	.0652	15.3374
7079	Ranigarh, H. S.	...	...	...	.0687	14.5624
5675	Mabegarh, H. S.	...	...	...	.0750	13.3333
7371	Ghandial, H. S.	...	...	..	.0698	14.3266
12541	Kiderkanta, H. S.	...	...	...	.0480	20.8377
9946	Nagtiba, H. S.	...	...	...	.0521	19.1902
2970	Dhoiwala, H. S.	...	...	...	.0628	15.9363
7454	Banog, H. S.	...	...	...	.0612	16.3479
3161	Amsot, H. S.	...	...	...	.0565	17.6897
11997	Chur, H. S.	...	...	..	.0530	18.8857

73. Conclusion deduced from foregoing table.—Now since Sin \angle incidence

————— = 1 + *m* in the mean state of atmosphere and at Sin \angle refraction

the level of the sea, and also, since the quantity *m* varies with the density of the atmosphere, so that when the density of the air is only the *n*th part of what it is at the level of the sea, the refractive power is

there only 1 + $\frac{m}{n}$, it might have been expected from these tabulated

results that in the first instance, *f* \propto $\frac{1}{\text{height of station of observation.}}$

No such law, however, is to be found unless the numerous exceptional cases be excluded to make a rule.

74. Wherefore it appears, that the law of variation in *f* due to variation in the density of the atmosphere, consequent on variation in height, is completely absorbed and lost sight of in the irregular variations, arising from local causes and also from the unavoidable imperfections of observation to points so ill-defined as the apices of snowy mountains.

75. Finally it is to be noticed that the foregoing method is acknowledged to be imperfect and unsatisfactory, but compared with the ordinary mode of finding *f* from reciprocal vertical observations,

it is believed that the values herein determined are a nearer approximation to the truth.

76. *Notices certain refinements not appreciable in these operations.*—In concluding the remarks on these computations, it may be interesting to notice certain refinements in calculation which have not been deemed applicable to these operations. For instance, the spheroidal excess and the contained arc might have been computed by more rigorous processes, but that the refinement would have been purely of an arithmetical nature. Again the formula for latitude and longitude has not been employed beyond its fourth term, because the remaining terms are difficult of arithmetical expression and would besides have given no results commensurate with the labour necessary to compute them. Similarly the chord correction is neglected in these heights, amounting as it does in the extreme case of Menai to Mont Everest, or XV, to no more than a foot.

77. There remains to notice one other correction also herein not taken into account, of which it may be remarked, that, under existing circumstances it would partially cancel the chord correction, if both these refinements were introduced. This correction may be stated thus.

78. Ordinarily, in the formula for computing difference of height, it is sufficiently accurate to assume the given arc (or distance) to belong to a circle, whereas in reality, it is a portion of an ellipse. If the correction due to this assumption $= x b$, then it can be shown that $x b = (v_a - \cos \lambda_b K) - (v_b - \cos \lambda_a K)$, wherein $K = \frac{N}{M} [(M + v_a \cos \lambda_a) (M - v_a \cos \lambda_a)]^{\frac{1}{2}} - \frac{N}{M} [(M + v_a \cos \lambda_b) (M - v_b \cos \lambda_b)]^{\frac{1}{2}} \} \operatorname{Cosec} \delta \lambda$.

It is sufficient to remark in this place, that in the extreme case of Menai, T. S. to Mont Everest or XV. the correction $x b =$ only 0.3 of a foot.

79. *Magnitude of these operations illustrated.*—Lastly it may be interesting to notice, that the area of the largest triangle to points on the Himalaya mountains (No. 297) is about 1706 square miles, its spheroidal excess being $106''$. The longest side, Anarkali, T. S. to XXXIX. is equal to 151 miles, and its corresponding contained arc

is $7886'' =$ about the $\frac{1}{164}$ *th* part of a circle described around our planet. And if the principal and mountain operations of the North East longitudinal series be taken together, they will be found to cover somewhat more than the $\frac{1}{3182}$ portion of the entire earth's surface ; or, taking the land at half the expanse of water, about 1061 such series would cover every portion of the former.

80. *Accuracy discussed.*—And with regard to the accuracy of the mountain results, it is evident that the same estimate cannot equally apply to a peak with a sharp conical apex, and to a mountain whose summit represents a saddle back or an even bluff. Prominent amongst the accurately determined points are XIII. Mont Everest or XV. and XLII. or Dhoulagiri, both in respect to geographical position and height above sea level, but though such points are far more numerous than those which exhibit comparatively large differences between the several values composing their mean results, yet it is suggested that the synopsis of latitudes and longitudes and the paper of heights should be consulted before adopting a point, if necessary for rigorous purposes.

81. *The same estimated.*—It is estimated, that on an average, the points on the Himalaya mountains are correct in latitude to $\frac{1}{4}$ of a second and in longitude to about $\frac{1}{2}$ that quantity. The heights are probably true to 10 feet, but this last estimate must be qualified by the consideration that they are all too low from the deflection due to mountain attraction.

82. *Why mountain attraction was not determined.*—In the original design of these operations, it was intended that the deflections in azimuth and in the meridian due to the attraction of the Himalaya mountains should be estimated along the principal series by suitable celestial observations, but this intention was relinquished owing to the considerable delay it entailed.

84. *Area and cost.*—The area covered by these principal and secondary operations amounts to about 61,815 square miles. But the piecemeal nature of work, the long intervals which frequently occur, and the unavoidable employment of the North East longitudinal series partly on other duties, make it a difficult and unsatisfactory process to attempt finding the cost of these operations. As an approximation, however, it may be stated that this cost does not exceed Rupees 2 per square mile,

Table of characteristic marks, for the snowy peaks of the North East longitudinal series, great Trigonometrical Survey of India, and identification with other authorities.

Final Numeral and Name adopted.	Country.	Identification with other authorities.
I. or Choomlari, ..	Tibet.	
II. or Gipmochi, ..	Bhotan.	
III. or Porohoonri, ..	Tibet & Sikkim.	Named by Dr. Hooker, Donkiah.
IV. or Choomoonko, ..	do.	Named by Dr. Campbell, Chola.
V. or Black rock, ..	do.	Named by Dr. Campbell, Gnaream.
VI. or Narsing, ..	Sikkim.	
VII. or Pandim, ..	do.	
VIII. or Kanchinjinga, ..	do.	
IX. or Kanchinjinga, ..	Nepal & Sikkim.	
X. or Kabroo, ..	do.	
XI. or Jannoo, ..	Nepal.	
XII.	do.	
XIII.	do.	
XIV.	do.	
XV. or Mont Everest, ..	do.	
XVI.	do.	
XVII.	do.	Colonel Crawford's A.
XVIII.	do.	Colonel Crawford's B.
XIX.	do.	
XX.	do.	Colonel Crawford's C.
XXI.	do.	Colonel Crawford's D.
XXII.	do.	Colonel Crawford's E.
XXIII.	do.	
XXIV.	do.	
XXV. or Dayabang, ..	do.	Colonel Crawford's L. or Dayabang.
XXVI.	do.	
XXVII.	do.	
XXVIII.	do.	
XXIX.	do.	
XXX.	do.	
XXXI.	do.	
XXXII.	do.	
XXXIII.	do.	
XXXIV.	do.	
XXXV.	do.	
XXXVI.	do.	
XXXVII.	do.	
XXXVIII.	do.	
XXXIX.	do.	
XL.	do.	
XLI.	do.	
XLII. or Dhoulagiri, ..	do.	Capt. Webb's Dhawalagiri, (Dhoula- [giri.]
XLIII.	do.	
XLIV.	do.	
XLV.	do.	
XLVI.	do.	
XLVII.	do.	
XLVIII.	do.	
XLIX.	do.	

Final Numeral and Name adopted.	Country.	Identification with other authorities.
L.	Nepal.	
LI.	do.	
LII.	do.	
LIII. or Api, ..	do.	Capt. Webb's XXIII. (Api.)
LIV. or Panchachuti,	Kumaon.	Capt. Webb's XIX.
LV.	do.	Capt. Webb's XVIII.
LVI. or Nandakut, ..	do.	Capt. Webb's XV.
LVII.	do.	
LVIII. or Nandadebi,	} Kumaon & British Gurhwal.	Capt. Hodgson and Lt. Herbert's A. No. 2; Capt. Webb's XIV.
LIX. . . .		Capt. Webb's XIII. (East) Trisool.
LX. or (East) Trisool,	British Gurhwal.	Capt. Hodgson and Lt. Herbert's P or A. No. 3, Capt. Webb's N.
LXI.	Kumaon and British Gurhwal.	
LXII. or (West) Trisool.	British Gurhwal.	Capt. Hodgson and Lt. Herbert's A. No. 1; Capt. Webb's XII. or West Trisool.
LXIII.	do.	.
LXIV. or Nandakna, .	} do.	Capt. Webb's XI. (Nandakna.)
LXV. or Nandakna, ..		
LXVI.	do.	Capt. Webb's K.
LXVII. or Kamet or Ibi Gamin, ..	Tibet and British Gurhwal.	Capt. R. Strachey's Kamet, named by* Messrs. Schlagintweit Ibi Gamin.
LXVIII. or Nilakanta,	British Gurhwal.	Capt. Webb's IX. (Nilakanta.)
LXIX. or Badrinath, ..	do.	Capt. Hodgson and Lt. Herbert's B. Middle peak Badrinath, Capt. Webb's VIII.
LXX.	do.	Capt. Webb's VI.
LXXI.	do.	Capt. Webb's G.
LXXII. or Kedarnath,	Gurhwal and British Gurhwal.	Capt. Hodgson and Lt. Herbert's D. or Kedarnath, Capt. Webb's III. Mr. Keelan's a.
LXXIII.	} Gurhwal.	Capt. Hodgson and Lt. Herbert's M. or Mont Moira, Capt. Webb's I. Mr. Keelan's e.
LXXIV. or Tharlasagar,		
LXXV. or Jaouli, ..	do.	Capt. Hodgson and Lt. Herbert's C. or Jaouli, Mr. Keelan's i.
LXXVI. or Bus Peak or Srikanta, ..	do.	Capt. Hodgson and Lt. Herbert's G. or Srikanta. Mr. Keelan's d. Mr. Mulheran's I. or Srikanta. Mr. Dyer's Srikanta.
LXXVII. or Banderpooneh,	do.	Capt. Hodgson and Lt. Herbert's Great E. or Banderpooneh. Mr. Keelan's a. Mr. Dyer's l.
LXXVIII. . . .	do.	Capt. Hodgson and Lt. Herbert's Low E.
LXXIX. or Sargoroen,	do.	Capt. Hodgson and Lt. Herbert's H. Left peak.

* Capt. Strachey's Kamet, Lat. 30° 55' 20" Long. 79° 37' 55" Heigt. 25500 ft.
LXVII..... „ 30 55 13 „ 79 38 4 „ 25373

{ Vide map of Kumaon and British Gurhwal.

NORTH-EAST LONGITUDINAL SERIES.

General Alphabetical List of Latitudes, Longitudes and Heights.

No.	Names of Places.	Latitudes.	Longitudes.	Heights above sea level.	District.	Remarks.
		° ' "	° ' "	feet.		
1309(1)	Darjeeling Church, N. W. spire, ..	27 2 52	88 18 36	..	British Sikkim.	
1310(1)	Darjeeling, Campbell's (Dr.) centre chimney, ..	27 2 23	88 18 32	..	Do.	
1209	Darjeeling, H. S., ..	27 2 49.65	88 18 40.76	7169	Darjeeling, British Sikkim.	
181	Kishanganj Rajah's Noubatkhana, ..	26 6 18	87 59 22			
650	Debi Patan Temple, ..	27 32 10	82 26 15			
841	Bhinga Fort, ..	27 41 49	81 58 52			
873	Akowna Temple, Golden Kalas in the centre of city, ..	27 31 56	82 0 45			
1193(1)	Shahjehanpoor Hakeem Maindees Koti, large 2-storied house, centre of stair-case, ..	27 53 54	79 58 12			
1194(1)	Shahjehanpoor, Magistrate's and Collector's Office, most northern skylight, ..	27 53 8	79 57 40		Landour Hills, N. of Dehra.	
1326(1)	Landour Hospital, ..	30 27 19	78 8 50	7383	Do.	
1327	Landour Lalitaba Hill Station, ..	30 27 30	78 8 32	7485	Do.	
1328(1)	Landour Protestant Church, ..	30 27 40	78 8 16	7308	Do.	
1221(1)	Masuri Camel's Back H. S., ..	30 27 36.41	78 6 58.71	7050	Do.	
1319(1)	Masuri Library, top of S. E. corner, ..	30 27 35	78 6 23	6620	Do.	
1317(1)	Masuri Himalaya Club top of westernmost chimney, ..	30 27 14	78 7 37	6789	Do.	
1220	Dehra Dhoon Observatory Station, ..	30 19 57.12	78 6 2.20	2310	Dehra Dhoon.	

NORTH-EAST LONGITUDINAL SERIES—(Continued.)

Points on the great Himalaya Ranges.

No.	Names of Places.	Latitudes.			Longitudes.			Heights above sea level.	District.	Remarks.
		°	'	"	°	'	"	feet.		
1223	I. or Choomalari,	27	49	42	89	18	43	23914	Tibet.	
1224	II. or Gipmochi,	27	16	27	88	56	37	14518	Bhotan.	
1225	III. or Powhoonri,	27	56	57	88	53	5	23186	Tibet and Sikkim.	
1226	IV. or Choomoonko,	27	27	32	88	49	38	17325	Do.	
1227	V. or Black Rock,	27	34	11	88	48	39	17572	Do.	
1228	VI. or Narsing,	27	30	40	88	19	28	19146	Sikkim.	
1229	VII. or Pandim,	27	34	38	88	15	35	22017	Do.	
1230	VIII. or Kanchinjinga,	27	41	30	88	11	50	27815	Do.	
1231	IX. or ditto,	27	42	9	88	11	26	28156	Nepal and Sikkim.	
1232	X. or Kabroo,	27	36	30	88	9	15	24015	Do.	
1233	XI. or Jannoo,	27	40	56	88	5	13	25304	Nepal.	
1235	XIII.	27	53	22	87	7	54	27799	Do.	
1236	XIV.	27	46	31	87	1	21	24020	Do.	
1237	XV. or Mont Everest,	27	59	17	86	58	6	29002	Do.	
1238	XVI.	27	45	20	86	51	56	22215	Do.	
1239	XVII.	27	45	16	86	36	57	22826	Do.	
1240	XVIII.	27	52	51	86	31	57	21987	Do.	
1241	XIX.	27	58	18	86	28	32	23570	Do.	
1242	XX.	27	57	52	86	22	42	23447	Do.	
1243	XXI.	27	57	29	86	9	8	19560	Do.	
1244	XXII.	28	7	41	85	54	42	21853	Do.	
1245	XXIII.	28	21	8	85	49	21	26305	Do.	
1246	XXIV.	28	10	25	85	49	17	22891	Do.	
1247	XXV. or Dayabang, ..	28	15	22	85	33	35	23762	Do.	

1248	XXVI.	..	..	..	28	23	30	85	10	12	24313	Do.
1249	XXVII.	..	..	..	28	20	43	85	7	24	23313	Do.
1250	XXVIII.	..	..	..	28	26	3	84	41	0	25818	Do.
1251	XXIX.	..	..	..	28	30	12	84	36	34	25729	Do.
1252	XXX.	..	..	..	28	33	0	84	36	9	26680	Do.
1255	XXXIII.	..	..	..	28	29	23	84	13	56	22947	Do.
1256	XXXIV.	..	..	..	28	32	5	84	9	52	26069	Do.
1257	XXXV.	..	..	..	28	32	11	84	7	32	24718	Do.
1258	XXXVI.	..	..	..	28	35	3	84	1	57	24780	Do.
1259	XXXVII.	..	..	..	28	29	42	83	59	22	22964	Do.
1260	XXXVIII.	..	..	..	28	29	54	83	59	20	22986	Do.
1261	XXXIX.	..	..	..	28	35	44	83	51	46	26522	Do.
1262	XL.	..	..	..	28	31	5	83	50	55	23641	Do.
1263	XLI.	..	..	..	28	39	17	83	46	22	22471	Do.
1264	XLII. or Dhoulagiri,	..	..	..	28	41	48	83	32	9	26826	Do.
1265	XLIII.	..	..	..	28	45	45	83	25	52	25456	Do.
1266	XLIV.	..	..	..	28	45	13	83	25	12	25299	Do.
1267	XLV.	..	..	..	28	44	2	83	24	18	24912	Do.
1268	XLVI.	..	..	..	28	44	7	83	21	20	25095	Do.
1269	XLVII.	..	..	..	28	40	26	83	19	6	23565	Do.
1270	XLVIII.	..	..	..	28	43	54	83	15	9	24181	Do.
1271	XLIX.	..	..	..	28	44	52	83	11	18	23779	Do.
1272	L.	..	..	..	28	44	36	83	9	29	21727	Do.
1273	LI.	..	..	..	28	45	59	83	8	27	21472	Do.
1274	LII.	..	..	..	28	49	39	82	39	33	19415	Do.
1276	LIV. or Panchachuli,	..	..	..	30	12	51	80	28	9	22673	Kumaon.
1277	LV.	..	..	..	30	15	12	80	25	5	21471	Do.
1278	LVI. or Nandakut, ..	..	..	..	30	16	51	80	6	39	22538	Do.
1279	LVII.	..	..	..	30	21	58	80	2	21	24417	Do.
1280	LVIII. or Nanda Debi,	..	..	..	30	22	31	80	0	50	25661	Kumaon and British Gurhwal.
1281	LIX.	..	..	..	30	22	35	80	0	46	25587	Do.
1282	LX. or East Trisool,	..	..	..	30	16	14	79	54	51	22342	British Gurhwal.
1283	LXI.	..	..	..	30	30	56	79	54	31	23092	Kumaon and British Gurhwal.
1284	LXII. or West Trisool,	..	..	..	30	18	43	79	49	7	23382	British Gurhwal.

NORTH-EAST LONGITUDINAL SERIES—(Concluded.)

No.	Names of Places.	Latitudes.			Longitudes.			Heights above sea level.	District.	Remarks.
		°	'	"	°	'	"	feet.		
1285	LXIII. ..	30	22	9	79	45	40	19916	British Gurhwal.	
1286	LXIV. or Nandakna, ..	30	20	56	79	45	36	20722	Do.	
1287	LXV. or ditto, ..	30	20	57	79	45	35	20773	Do.	
1288	LXVI. ..	30	41	6	79	44	53	22093	Do.	
1289	LXVII. or Kamet or Ibi Gamin, ..	30	55	13	79	38	4	25373	Tibet and British Gurhwal.	
1290	LXVIII. or Nilakanta, ..	30	43	52	79	26	56	21661	British Gurhwal.	
1291	LXIX. or Badrinath, ..	30	44	16	79	19	20	23210	Do.	
1292	LXX. ..	30	43	22	79	17	52	22511	Do.	
1293	LXXI. ..	30	46	44	79	16	58	22347	Do.	
1294	LXXII. or Kedernath, ..	30	47	53	79	6	34	22790	Gurhwal & British Gurhwal.	
1295	LXXIII. ..	30	51	40	79	2	14	22582	Gurhwal.	
1296	LXXIV. or Tharlasagar, ..	30	51	41	79	2	13	22628	Do.	
1297	LXXV. or Jaonli, ..	30	51	18	78	53	53	21672	Do.	
1298	LXXVI. or Bus Peak or Srikanta, ..	30	57	25	78	50	50	20149	Do.	
1299	LXXVII. or Banderpoonch, ..	31	0	12	78	35	45	20758	Do.	
1300	LXXVIII. ..	31	0	25	78	34	6	20038	Do.	
1301	LXXIX. or Sargoroen, ..	31	6	8	78	32	32	20405	Do.	

The Latitude depends on the value of that element adopted for Kalianpoor Station = $24^{\circ} 7' 11''.262$.

The Longitude is referrible to the old value for the Madras Observatory = $80^{\circ} 17' 21''$ to which a correction of $-3' 25''.5$ is applicable to reduce to the value adopted by the Admiralty and Royal Astronomical Society or $-3' 1''.8$ to reduce to the result of Taylor's observations up to 1845.

The Heights' originate from the mean sea level, observed in Kydd's Dock-yard, Calcutta.

A Letter from ARCHDEACON PRATT on COLEBROOKE'S determination of the date of the Vedas.

Calcutta, March 21st, 1862.

MY DEAR PROFESSOR COWELL,—In reply to your question, How did Colebrooke deduce the age of the Vedas from the passage which he quotes from the Jyotish or Vedic Calendar in his Essays (vol. i. p. 110) ? I beg to send you the following remarks.

In that passage it is stated that the Winter Solstice was, at the time the Vedas were written, at the beginning of S'ravishtá or Dhanishthá, and the Summer Solstice at the middle of As'leshá.

Now the Hindoos divided the Zodiac into 27 equal parts called *Lunar Mansions*, of $13^{\circ} 20'$ each. Their names are

1. As'winí	10. Maghá	19. Múla
2. Bharaní	11. P. Phalguní	20. P. Áshádhá
3. Kṛittiká	12. U. Phalguní	21. U. Áshádhá
4. Rohiní	13. Hasta	22. S'rávana
5. Mṛigas'iras	14. Chitrá	23. Dhanishthá
6. Árdrá	15. Swáti	24. S'atabhishá
7. Punarvasu	16. Vis'ákhá	25. P. Bhádrapadá
8. Pushya	17. Anurádhá	26. U. Bhádrapadá
9. As'leshá	18. Jyeshthá	27. Revatí.

The position of these Lunar Mansions among the stars is determined by the stars themselves and not by the sun, and is therefore unaffected by the precession of the equinoxes. If, therefore, we can determine their position at any one epoch, we know their position for all time. The Hindoo books furnish us with the requisite information. In the translation of the Súrya Siddhánta published in the Bibliotheca Indica, Chap. VIII. p. 62, you will find that the conspicuous star Regulus, or α Leonis, is placed by the Hindoo Astronomers at 4 signs, 9 degrees from the beginning of these Lunar Mansions (or Asterisms, as they are there called). As 4 signs equal one-third of the whole zodiac, they equal 9 lunar mansions. Hence the position of Regulus is 9° in Mágha the 10th lunar mansion.

But by the Jyotish, the Summer Solstice was in the middle of As'leshá, the 9th lunar mansion, at the epoch of the Vedas: therefore Regulus was half a lunar mansion $+ 9^{\circ}$, that is, $15^{\circ} 40'$, east of the Summer Solstice at that time.

By the Nautical Almanac for 1859, the position of Regulus is given as follows:—

Right ascension, January 1st, 1859,	...	...	10 ^h . 0 ^m . 53 ^s .
North declination, ditto,	...	...	12° 39' 12."7.

From this I obtain, by spherical trigonometry, the following result:—

Longitude of Regulus, January 1st, 1859,	...	147° 52' 30".
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Hence Regulus was east of the Summer Solstice at that date by 57° 52' 30". The Summer Solstice had, therefore, retrograded through 42° 12' 30" = 42°.208 since the epoch of the Vedas. As the equinoxes and solstices move backward on the ecliptic at the rate of 1° in 72 years, it must have occupied $72 \times 42°.208 = 3039$ years to effect this change.

Hence the age of the Vedas was 3039 on 1st January, 1859; or their date is 1181 B. C., that is, the early part of the twelfth century before the Christian era.

This differs from Mr. Colebrooke's result: he makes it the 14th century. Two more degrees of precessional motion would lead to this; but where he gets these from, I do not know, unless it be by taking the *constellations* loosely, instead of the exact lunar mansions. Thus Dhanishthá being taken to be the lunar mansion *above which the Dolphin* occurs, it is possible that he may have considered the first star in the constellation Dolphin to be the "beginning of Dhanishthá" alluded to in the Jyotish; and similarly he may have taken a star in the middle of Hydra's head to represent the "middle of A'slesh'a." But even this supposition will not carry us into the 14th century. If we take the first star ϵ in Dolphin and the opposite star ζ in Hydra's Head to be the solstitial points, the precessional motion will only be about 40' *more* than above, and the date will be B. C. 1229 or late in the 13th century. But then ζ is *not* in the middle of Hydra's head; it is about 2° east of it; and therefore I have no doubt the lunar mansion, and not the constellation, is what the Jyotish refers to, and the early part of the 12th century is the correct result.

I am, your's very truly,

JOHN H. PRATT.

To Professor COWELL,

Secretary of the Asiatic Society of Bengal.

Literary Intelligence.

Our oriental readers will recollect that, in the October Meeting, the Society accepted Dr. Fitz-Edward Hall's offer to publish in the *Bibliotheca Indica*, a fragment of the very rare *Nāṭya S'āstra* of Bharata,—a work, which, though frequently quoted by mediæval scholiasts, had never before been met with by any European, and of which Professor Wilson had even doubted the very existence. “As far as has been ascertained, the work of Bharata has no existence in an entire shape, and it may be sometimes doubted whether the rules attributed to him are not fabricated for the occasion.”* Dr. Hall, however, had been fortunate enough to discover a fragment of this singular production, containing the first seven *adhyāyas*, and as many of the quotations in the scholiasts could be verified in them, any doubts as to the existence of the original work were of course at once set at rest.

Unfortunately this fragment was very corrupt and it abounded with hiatuses and doubtful readings. Dr. Hall has just written to us, previous to his departure viâ Bombay to England, the following interesting intelligence from Bhelsa :

“Going into the city to-day (Feb. 21) to read an old inscription, I was accosted by a very intelligent looking pundit. We chatted on for an hour or so, and I discovered that he had a MS. of Bharata. He has given it to me. It contains 277 leaves,—the entire work in 36 *adhyāyas*, and was written in Samvat 1575.”

Bharata appears to have written a complete *Ars Poetica*, and he has discussed at great length the theory of the poetical sentiments, &c., as well as the various parts of the dramatic art. On the whole, we consider Dr. Hall's discovery one of the most curious made of late in old Indian literature.

The following is an extract from a letter dated 31st May last addressed to Babu Rajendra Lal Mitra by Professor Holmboe of Christiana.

“Je vous envoie avec cette lettre quatre mémoires, qui ont été lus dans notre société de sciences, dont j'ai l'honneur d'être le president

* *Hindu Drama*, Vol. 1. p. xx.

actuel. Dans celui sur Krodo j'ai démontré, que l'ancien idol, qu'adoraient les anciens Saxons sous ce nom, n'est autre chose que क्रौड des Indiens, un des noms de Saturne, avec lequel le Krodo des Saxons est aussi assimilé. J'y ai trouvé aussi, que Hain, un des noms tropiques de la mort en Saxe, est identique avec le Sanscrit शनि. Le mémoire sur quelques monuments cruciformes touchent à peine l'Orient. J'ai néanmoins y hasardé la supposition, qu'elles puissent avoir quelque rapport à un des symboles, qui apparaissent sur les monnaies asiennes, à savoir un aerole d'où sortent quatre lignes en forme d'une croix. Dans le mémoire, qui traite des sculptures sur les rocs de Scandinavie, j'ai démontré, qu'elles sont analogues à quelques sculptures sur les topes de Sanchi près de Bhilsa, représentant la mort de Buddha, et j'ai taché de prouver, que les navires ou bateaux et les roues, qui se trouvent en grand nombre sur nos rocs, sont des monuments sur les morts. Dans le quatrième mémoire, traitant du pouvoir d'amulette, qui a été attribué aux armes et instrumens pointus et escarpés et même au métal et à la pierre, j'ai rassemblé un certain nombre d'analogies de l'Asie centrale, des exemples analogues de l'Inde m'étant inconnus. Je ne doute pas, que la même superstition a regné et regne peut-être encore en l'Inde. Voudriez vous m'indiquer quelque livres, où on en a traité, je vous serai très obligé.

“ Vous voyez, que mes recherches découvrent de temps en temps quelques nouveaux liens entre les Germains-Scandinaves et les Ariens,—découvertes, qui rehaussent mon zèle pour la continuation de telles recherches.”

PROCEEDINGS
OF THE
ASIATIC SOCIETY OF BENGAL,
FOR JANUARY, 1862.

The Annual General Meeting of the Asiatic Society was held on the 15th instant.

A. Grote, Esq., President, in the chair.

The following resolution proposed by Sir Bartle Frere and seconded by Captain W. N. Lees, was carried unanimously.

That this meeting not having been called in strict accordance with Rule 46, the meeting resolves that the present shall be held to be the Annual Meeting.

The following gentlemen duly proposed at the last meeting were balloted for, and elected ordinary members.

Major D. Briggs (re-elected), G. E. Ward, Esq., C. S., and W. King, Junior, Esq.

The following gentlemen were named for ballot at the next meeting.

Colonel H. Torrens, proposed by the President, seconded by Sir B. Frere.

Captain E. Smyth, proposed by the President, seconded by Mr. Atkinson.

Baboo Gour Doss Bysack, proposed by the President, seconded by Baboo Rajendralal Mitra.

Colonel C. S. Guthrie, Bengal Engineers, proposed by Mr. Atkinson, seconded by the President.

The Secretary read the following Report for 1861.

ANNUAL REPORT.

In submitting their annual report on the state of the Society's affairs during the past year, the Council have again the satisfaction of adverting to its generally promising character.

The number of elections during 1861, has been fifty-one, being less by eighteen than that of the preceding year, but considerably exceeding the general average (16) of the previous ten years.

At the same time, two members have been lost to the Society by death, and nine by retirement. Deducting these, the number of ordinary members on the rolls at the end of the year was 281 against 242 in 1860.

Of the ordinary members now on the rolls, 55, or about one-fifth are absent from India, leaving 226 on the paying list.

The table in the margin shows the fluctuation in the number of

	Ordinary.	Paying.	Absent.
1851	130	124	6
1852	139	122	17
1853	146	123	23
1854	155	129	26
1855	162	128	34
1856	167	131	36
1857	147	109	38
1858	133	193	38
1859	180	135	45
1860	242	195	47
1861	281	226*	55

* Of this number one is a life-member.

members during the last ten years.

The only corresponding member elected during the year is Dr. R. Gosche of Berlin.

Among those who have been lost to the Society by death, the Council have to record with much regret, the name of Col. R. Baird Smith,

C. B. The unceasing interest which Col. Baird Smith, evinced in all

scientific questions connected with India, naturally led him to take an active part in the affairs of the Society, and to forward its objects whenever opportunity offered. In him the Society has to deplore the loss of a scientific scholar of high attainments, and a frequent contributor to its Journal.

Mr. Freeling, who also died within the year, was an able numismatist and a zealous member.

FINANCE.

The financial position of the Society may, on the whole, be regarded as satisfactory.

Contributions.				members now on the rolls—107	
1851	8583	4	5	Residents and 119 non-residents—	
1852	6373	1	3	at the rates of Rs. 48 and Rs. 24	
1853	7778	9	3	respectively, is Rupees 7,992. The	
1854	7082	0	0	subscriptions actually realized includ-	
1855	7166	0	0	ing arrears of previous years have,	
1856	8096	0	0	however, only amounted to Rupees	
1857	7068	0	0	6,812. This sum though in excess	
1858	6923	8	0	of the collections of 1860, falls short	
1859	6750	0	0	of the average collections of the last	
1860	6441	0	0	ten years (as shewn in the margin)	
<hr/> 72,260		6	11		
<hr/>					
Rs.					
The average of which is 7,226-2-3					
by about Rs. 400.					

The assets of the Society amount to Rs. 7,431-9-8 exclusive of the				amount of outstanding claims Rupees	
* Arrears due from Re-				6,639-8-6 the greater portion of which	
sidents,	1,242	0	0	(as shewn in the margin)* is on ac-	
— from non-Resi-				count of arrears of contributions. The	
dents,	1,711	3	8	liabilities amount to Rs. 4,539-5-4	
— of subscriptions				chiefly on account of printing.	
at the old rate, ..	2,088	10	0		
<hr/> Total, .. Rs. 5,041 14 3					

The estimate of the probable income and expenditure of the Society for the ensuing year is as follows:—

INCOME.

Contributions, ...	...	6,660	0	0
Admission fees,...	...	1,470	0	0
Journal, ...	...	660	0	0
Library, ...	...	450	0	0
Museum, ...	...	3,615	0	0
Secretary's Office,	...	12	0	0
Vested Fund, ...	...	245	0	0
General Establishment,	...	12	0	0
Coin Fund, ...	...	40	0	0
<hr/>				13,164 0 0

EXPENSES.

Journal, ...	...	2,100	0	0
Library, ...	...	1,905	0	0
Museum, ...	..	5,920	0	0

Secretary's Office,	...	1,767	0	0
Building,	...	396	0	0
Vested Fund,	...	10	0	0
Coin Fund,	...	166	0	0
Income Tax,	...	120	0	0
Miscellaneous,	...	541	0	0
<hr/>				12,925 0 0

LIBRARY.

The Library has received an addition of about 450 volumes, during the past year, the greater part of which are presentations from various learned and scientific institutions and individuals with whom the Society is in correspondence. Some Oriental works have been purchased and a few scientific periodicals and Reviews.

COIN FUND.

The numismatic collection has received no addition of moment during the period under review, some duplicate copper and silver coins of the later Mahomedan kings of India, have been sold, and other coins principally Bactrian, have been purchased.

Exchanges which will fill several gaps in this interesting series of medals, are now being made with Colonel Cunningham, and the Coin Committee are taking advantage of Mr. E. C. Bayley's presence in Calcutta, to introduce some order into their Cabinet.

MUSEUM.

The accessions to the Museum during the last year have been varied and interesting.

The most important of these additions is an extensive collection of casts chiefly facial, illustrative of the various races of India and Central Asia, prepared by the enterprising travellers Messrs. de Schlagintweit. This valuable collection has been transferred to the Society's Museum from the Medical College by order of Government. For the better arrangement and display of these casts, several new stands and frames have been prepared. A small selection of twenty casts from the series had previously been presented to the Society by Herr R. de Schlagintweit.

In the Mineralogical department has been added several magnificent aerolites which fell on the 12th of May last in the district of Goruckpore. Five fragments of this fall have been received, speci-

mens of which are about to be sent to the British Museum in exchange for specimens of other aerolites.

Mr. Blanford has completed a descriptive and illustrated catalogue of the Society's collection of fossil remains, chiefly consisting of Cephalopoda, from the beds of the Spiti valley.

The catalogue of mammalia, the Council are again sorry to report, has not been completed. This is chiefly to be ascribed to the serious illness and consequent prostration of strength of the Curator, Mr. Blyth, which has obliged him on two occasions to seek a change of climate. He obtained on this account five months' leave of absence during the year.

The Council regret that the condition of the museum remains unimproved. Relying on the known disposition of Government both here and at home, to aid the Society in the preservation of their valuable collection at all events till the question of the establishment of an Imperial museum should be finally disposed of, the Council addressed the Home Secretary on the 20th April last to press on the reconsideration of Government, their previous application for an additional grant of Rs. 200 per month, but up to the close of the year no reply was received.*

The Council are glad to observe that the museum continues to be				an object of considerable public interest and attraction. The annexed memo. will show that the average No. of visitors exceeds 250 per diem.
NATIVES.				Having learnt that her Majesty's Government had issued orders to
Males,	..	..	82524	
Females,	..	..	4495	
EUROPEANS.				
Males,	..	..	2941	
Females,	..	..	1603	
Total,	..	..	91563	

The average being 251 per day.

No answer to this application has yet been received.

JOURNAL.

Three Nos. of the Journal have been published during the year, and a fourth is in the press. They contain papers of considerable

* The additional grant solicited has since been given.

interest on several subjects connected with the investigations in which the Society takes an active interest.

BIBLIOTHECA INDICA.

The Council are gratified to notice the continued activity which has prevailed during the past year in the different branches of the Bibliotheca Indica. Sixteen numbers have appeared of the new series and fifteen of the old.

In the new series the Vais'eshika Sutras have been completed with two commentaries under the editorship of Pundit Jayanáráyana Tarka Panchánana, and Dr. Ballantyne has published the S'ándilya Sutras with Swapnes'wara's commentary. Dr. Hall has published the first Fasc. of the Das'a-rúpa or Hindu canons of Dramaturgy, (the Fasc. concluding the work is in the press), and he has also in the press an edition of the very rare Nátya Sástra of Bharata. Mr. Cowell has edited the Kaushítaki Upanishad with S'ankaránanda's commentary; the Rev. K. M. Banerjea has published the first part of the Nárada Paneharátra; and the first part has been published of the translation of the Siddhánta S'iromani by the late Lancelot Wilkinson, Esq., revised by Pundit Bápu Deva.

Considerable progress has also been made in the series of Muhammadan historians of India: four Fas. have been issued of Zíá-i Barní's Táríkhi Ferozsháhi, and only one more remains to complete the work.

The Táríkhi Masáúdi of Baihakí, (as prepared for publication by the late W. H. Morley, Esq.) has been also commenced and two Fasc. have appeared.

The editors of the works in the old series have also made good progress towards the gradual completion of the publications still remaining unfinished.

Mr. Cowell has issued two Fasc. of the Black Yajush Sanhitá; and Babu Rájendralál Mitra has brought out two Fasc. of the Black Yajur Bráhmaṇa, and the concluding parts of the Kámandakíya Níti Sára, and of an English translation of the Chhándogya Upanishad. The Kámandakíya Níti Sára is a rare work on polity, and will prove interesting to Oriental scholars, while the translation is a valuable contribution to our knowledge of the literature of the Upanishads.

Pundit Rámnáráyana who undertook in the absence of Dr. Roer to complete the Vedánta Sutras, has published three Fasc. of that important treatise.

The Rev. K. M. Banerjea has issued two numbers of his edition of the Márkandeya Purána. Only one more fasciculus remains to complete that important work.

The titles of the Fasciculi of the old series published during the past year are :

The Dictionary of Technical Terms used in the Science of the Musulmans, P. II. edited by Mawlavies Abdul-Haqq and Gholám Kádir under the supervision of Captain W. N. Lees, LL. D., Nos. 167, 170, 173, Fas. XVII. XVIII. XIX.

2. The conquest of Syria commonly ascribed to Aboo Abd Allah Muhammad Bin Omar al Waqidi, edited by Captain W. N. Lees, LL. D., No. 168, Fas. VIII.

3. Márkandeya Purána, edited by Rev. K. M. Banerjea, Nos. 169, 177, Fas. V. and VI.

4. Sanhitá of the Black Yajur Veda with the commentary of Mádhava Áchárya, edited by E. B. Cowell, M. A.; Nos. 171, 180, Fas. XIV. XV.

5. Aphorisms of the Vedánta, by Bádaráyana with the commentary of S'ankara Áchárya and the gloss of Govinda Ananda, edited by Pundit Rámnaráyana Vidyaratna, Nos. 172, 174, 178, Fase. III. IV. V.

6. Taittiríya Bráhmaṇa of the Black Yajur Veda with the commentary of S'ayanáchárya, edited by Babu Rajendralal Mitra, Nos. 175, 176, Fase. X. XI.

7. Níti Sára or the Elements of Polity, by Kámandaki, edited by Babu Rajendralal Mitra, No. 179, Fase. II.

8. The Chhándogya Upanishad translated into English, by Babu Rajendralal Mitra, No. 181, Fase. II.

The titles of the Fasciculi of the new Series are :—

1. The Vais'eshika Dars'ana with the commentaries of S'ankara Mis'ra and Jayanaráyana Tarka Panchánana, edited by Pundit Jayanaráyana Tarka Panchánana, Professor of philosophy in the Sanscrit College of Bengal, Nos. 5, 6, 8, 16, Fase. II. III. IV. V.

2. Táríkhi Ferozsháhi of Zíá al Din Barni commonly called Ziaa-i-Barni, edited by Saiyid Ahmed Khan under the supervision of Captain W. N. Lees, LL.D. Nos. 7, 9, 14, 15, Fase. III. IV. V. VI.

3. Aphorisms of Sándilya with the commentary of Swapnes'wara edited by J. R. Ballantyne, LL. D. No. 11.

4. *Das'a-rúpa* or Hindu canons of Dramaturgy, by Dhananjaya; with the exposition of *Dhanika*, the *Avaloka*, edited by Fitz-Edward Hall, D. C. L., No. 12, Fasc. I.

5. *Hindu Astronomy*, II. *The Siddhánta S'íromani*. Translated from the Sanskrit. By the late Lancelot Wilkinson, Esq., C. S. and revised by Pundit Bápu Deva Sástri under the superintendence of the Ven'ble Archdeacon Pratt, No. 13, Fas. I.

6. *Náradapancharátra*, edited by Rev. K. M. Banerjee, No. 17, Fas. I.

7. *Tárikhi Baiháki* of Masaud, son of Sultan Mahmúd Gházi, edited by the late W. H. Morley, Esq., published under the superintendence of Maulavi Kabiruddeen Ahmed, Nos. 16, 18, Fas. I. II.

8. *Kaushítaki Upanishad*, edited by E. B. Cowell, M. A., Nos. 19, 20, Fas. I. II.

OFFICERS.

In consequence of the failing health of the Curator, Mr. Blyth, the Council on the 28th July last, again addressed a memorial to the Right Hon'ble the Secretary of State for India, soliciting a reconsideration of the decision by which Mr. Blyth's claim to pension was declared inadmissible. The Council are not without hopes that the long and valuable services of Mr. Blyth in advancing zoological science in India, will induce the Government to bestow on him a pension which has been fairly earned.

Bábu Gour Doss Bysack, who for some years held the office of Assistant Secretary and Librarian to the Society, having lately resigned, his place has been filled up by the appointment of Bábu Lalgopal Dutt, B. A., who had officiated for him on two different occasions. Babu Gour Doss Bysack was a zealous and active Officer and fully merited the approbation of the Council. His successor has also hitherto discharged his duties to their satisfaction.

The President in moving the adoption of the report observed :

"I venture to recommend for the meeting's approval and adoption the report which has just been read. It might, I think, have gone further had it not been the Council's province to confine it to matters of business. The year to which it relates has been on many accounts an interesting one, as the record of the Society's proceedings will, I think, show.

"These proceedings opened by Mr. Le Mesurier's communication

from Jubbulpore announcing the discovery of Celts in the neighbourhood of the Tonse river. This is believed to have been the first discovery of the kind in India, and gives us a special and local interest in questions which have lately been occupying prominent attention in Europe. I am in hopes that the new year will see arrangements made by the Council for pursuing enquiries as to what people are likely to have made or used these implements, and as to whether similar traces of human life at a very ancient period may not be forthcoming in other parts of India.

“I have already proposed to my colleagues on the Council that all advantage should be taken of our position in a country so rich as India is in ethnological materials. We have already the Schlagintweit casts and hope to secure a series of the photographic drawings which are now in course of preparation for dispatch to England by order of the different local governments. If we can succeed in collecting together the crania of some even of the many races which now exist in India, we shall have the means of assisting largely in researches which have assumed a new importance within the last year or two.

“Our March meeting was a crowded one. Captain Montgomerie, it will be remembered, on that evening exhibited to us his map of the Jummoo territories, and read his memo. on the progress of the Kashmir series of the Great Trigonometrical Survey, which was afterwards published in our Journal. It has been with the greatest satisfaction that I have observed during the last year or two, the increasing number of recruits which our list of members is receiving from the two great Surveys now in progress in India. I look on their adhesion to our Society as real strength gained, for these new members have the privilege of pursuing as a profession, investigations which enable them to contribute most valuable information to our Journal as well as to our general meetings.

“On another occasion we had from Captain Pelly an account of his adventurous ride without disguise and without arms from Trebizond to Kurrachee, and in May we listened to an interesting paper by Colonel Yule on some antiquities near Jubbulpore, and to some observations by Professor Oldham on a small but valuable collection of fossils which had been presented to his museum by his Excellency Sir William Denison who was himself present at the meeting. Mr.

Oldham showed us that he hoped to derive from this collection most material assistance in determining the question of the true age of the coal-bearing strata of this country.

“The June meeting was also an interesting one. Information was communicated to it of the fall of acrolites at Peeprassee on the 12th May, and further particulars of the previous fall at Dhurmsala,—a magnificent specimen of the former was exhibited.

“It was then also that we received the first announcement of the intention of Government to send an expedition across the snows under Captain E. Smyth to Chinese Tartary, and although this project has since been dropped in consequence of the failure to obtain passports for the party from Peking, it is to be hoped that it is abandoned for a time only. I am, I believe, at liberty to mention the names of the gentlemen who were to form Captain Smyth’s party. They were Dr. W. L. Stewart, Mr. H. B. Medlicott, Lieutenant Basevie and Dr. T. C. Jerdon.

“At our August meeting, Colonel Yule read a memo. drawn up by M. de Mazure, Vicar apostolic of Thibet, on the countries between that country Yunan and Burmah, which had been sent to us by Colonel Phayre. Lord Canning, it will be remembered, attended at this meeting. The subject was full of interest, for at the time we had not heard of Colonel Sarel’s return from his attempt to penetrate to Thibet through W. China. It was thought that any day might bring us news of him from Lhasa or even Darjeeling. Colonel Yule illustrated his remarks on the memo. by a map compiled by himself from the scanty materials available, and this map is, I believe, being published with the memo. in the forthcoming No. of our Journal. At the next meeting the failure of the Yang-tse Kiang expedition was announced, and soon afterwards the purport of the unfavourable reply from Peking to the application of the Indian Government for passports of Captain Smyth’s party was communicated to the Society. I earnestly hope that a renewed attempt which Colonel Sarel has applied for leave to make, up the Yangtse-Kiang, may ere long be sanctioned by the home Government, and that the same authorities may further permit the vigorous prosecution of other expeditions which have been mooted during the last year, and which have for their object the extension of our geographical knowledge of the countries on our northern and eastern frontiers.

“From the October and November meetings, I was unfortunately absent, but Colonel Yule, I sec, read at the first, a paper on the Indian remains in Java, and at the last Mr. H. F. Blanford read an abstract of his paper on the Gerard collection of Spiti fossils which have so long lain undescribed in our museum. Both these papers will appear at length in the Journal; at the same meeting was communicated Mr. Pogson’s observation on the new planet Asia, the first discovery of this kind I believe in India.

“The Nos. of the Journal too which have been published during the year, contain a larger proportion of papers on Oriental literature than the Nos. for the previous years. The Paris Society in Mr. Mohl’s annual report of July last, has again noticed the marked tendency towards natural history which characterizes our Journal for 1860—attributing it, however, to other causes than what appears to me to be the real one. I hope now that sanction has been given to Colonel Cunningham’s archæological mission, that our proceedings in the coming year will give proofs of our constancy to those tastes which have so materially helped to found our Society’s reputation. I anticipate loud approbation from European Orientalists of the work done in the past year by the editors of the 31 Nos. which have been published in the *Bib. Indica*. For our successful progress in the publication of this series, the Society is mainly indebted to Mr. Cowell, Babu Rajendralal Mitra and Captain Lees, whose press and able staff of Moulavies at the Madrassa remained at our service during Captain Lees’ absence in England.

“Altogether the year has been an interesting one, and if the meeting agree with me in thinking so, they will probably also agree with me in thinking that our success has been owing in no small degree to the general attention given to the Society’s affairs by its late Council and Secretaries.

“I regret extremely that our obituary should contain the name of one of our office-bearers so useful and active as Colonel Baird Smith, whose papers extend over our Journal for the last twenty years.”

The report was then put and adopted.

The meeting then proceeded to ballot for the Council and officers for the ensuing year. The Hon’ble H. B. Devereux and Mr. J. Sandars, were appointed Scrutineers, and at the close of the ballot, the chairman announced the following result.

COUNCIL.

A. Grote, Esq.,

President.

Lieutenant-Colonel H. L. Thuillier,

Babu Rajendralal Mitra,

T. Oldham, Esq.,

} *Vice-Presidents.*

Babu Ramapersaud Roy.

Hon'ble Sir H. Bartle Frere.

Hon'ble S. Laing.

Dr. W. Crozier.

Dr. J. Fayrer.

Lieutenant-Colonel H. Yule.

Captain W. N. Lees.

E. C. Bayley Esq.,

Dr. T. Anderson.

W. S. Atkinson, Esq.,

E. B. Cowell Esq.,

} *Joint Secretaries.*

ABSTRACT STATEMENT
OF
RECEIPTS AND DISBURSEMENTS
OF THE
ASIATIC SOCIETY,
FOR
THE YEAR 1861.

STATEMENT

Abstract of the Cash Accounts

		RECEIPTS.						
		1860.			1861.			
CONTRIBUTIONS, ...								
Received from Members,...		6,441	7	0	6,812	0	0	
ADMISSION FEE, ...								
Received from New Members,		2,016	0	6	1,472	0	0	
JOURNAL, ...								
Sale proceeds of, and Subscriptions to, the Journal of the Asiatic Society,					549	13	0	
Refund of Postage Stamps,					4	2	0	
		1,094	8	9		553	15	0
LIBRARY, ...								
Sale proceeds of Books, ...					385	8	0	
		432	11	6		385	8	0
MUSEUM, ...								
Received from the General Treasury at 300 Rs. per month, ...					3,600	0	0	
Savings, ...					19	5	0	
Fines, ...					2	0	0	
Refund of the price of 2 Benches for the Taxidermist's Room charged on the 6th April, 1861, ...					8	0	0	
		3,616	2	3		3,629	5	0
SECRETARY'S OFFICE,								
Sale of Postage Stamps, ...					7	15	0	
Discount on ditto, ...					2	3	0	
Refund of Postage, ...					1	0	0	
		15	9	0		11	2	0
VESTED FUND, ...								
Interest on Government Securities re- ceived from the Bank of Bengal,					245	0	0	
		245	0	0		245	0	0
COIN FUND,								
Sale proceeds of Old Coins,					118	11	9	
						118	11	9
MESSRS. WILLIAMS AND NORGATE,								
Freight on a Parcel received through Dr. E. Röer ...					3	12	0	
Ditto ditto through Rajah Radhakant Deva, ...					1	0	0	
		7	0	0		4	12	0
DEPOSIT, ...								
W. A. D. Anley, Esq. ...					30	0	0	
Harry Duhan, Esq. ...					18	0	0	
Baboo Nobin Chunder Roy,					6	1	0	
R. H. Russell, Esq. ...					18	0	0	
C. H. Barnes, Esq. ...					12	0	0	
Rev. S. Hislop, ...					4	6	0	
Capt. E. L. Earle, ...					32	0	0	
Major J. T. Walker, ...					18	0	0	
Carried over,		138	7	0	13,232	5	9	

No. 1.

of the Asiatic Society, for 1861.

DISBURSEMENTS.

	1860.	1861.
CONTRIBUTIONS, ...		
Receipt Stamps for collecting Contributions, ...	2 8 0	15 2 6
		15 2 6
JOURNAL, ...		
Freight, ...		72 4 0
Printing charges, ...		326 14 9
Commission on sale of Books, ...		27 10 9
Purchasing Postage Stamps, ...		33 12 0
Packing charges, ...		9 12 6
Engraving 3 Diagrams, ...		15 0 0
Ditto on Copper, 3 plates of Gems and Inscriptions, ...		60 0 0
Drawing a Map of Gilgit and the adjacent countries, ...		10 0 0
Ditto on Stone two portraits of the Andaman Islanders, ...		40 0 0
	3,183 9 7	595 6 0
LIBRARY, ...		
Salary of the Librarian for 12 months at Rs. 70 per month, ...		840 0 0
Establishment, ...		84 0 0
Purchase of Books, ...		50 0 0
Book-binding, ...		252 5 0
Commission on sale of Books, ...		86 0 9
Two new Teak wood Book cases, ...		300 0 0
Printing 150 copies of Shell Catalogue, ...		422 0 0
Lithographing and printing charges, ...		11 0 0
Charges for cleaning Books, ...		25 0 0
A new mat for the Library Room, ...		27 2 0
Two Blank Books, ...		4 15 6
Petty Charges, ...		6 0 0
	1,332 9 2	2,108 7 3
MUSEUM, ...		
Salary of the Curator, E. Blyth, Esq. at Rs. 250 per month, for 12 months, ...		3,000 0 0
House-rent at Rs. 80 per month, for 12 months, ...		960 0 0
Establishment, ...		744 0 0
Extra Taxidermist's Salary, ...		594 9 6
Contingent Charges, ...		246 10 9
12 yards Oil Cloth for laying over a part of the new Mat, ...		12 8 0
A new Mat for the Landing place, ...		31 12 0
Repairing old Mats, ...		3 0 0
Mr. E. Blyth's passage money to and from Moulmein, ...		252 0 0
A Blank Book for entering the names of Visitors, ...		8 0 0
Labelling the Meteoric Stones, ...		5 14 0
Carried over, ...	5,858 6 3	2,718 15 9

	1860.	1861.
	Brought over, ...	13,232 5 9
DEPOSIT— <i>Continued.</i>	138 7 0	
Baboo Shumbhoo Chunder Roy,	56 0 0	
Capt. Raverty, ...	26 12 0	
Capt. J. C. Haughton, ...	6 0 0	
C. J. Campbell, Esq. ...	24 0 0	
W. T. Dodsworth, Esq. ...	6 0 0	
R. H. M. Warrand, Esq. ..	16 0 0	
E. Blyth, Esq. ...	425 0 0	
	197 10 0	698 3 0
BALANCE OF 1860.		
Bank of Bengal, ...	1,654 13 2	
Cash in hand, ...	85 7 6	
Inefficient Balance, ...	250 12 6	
		1,991 1 2

Carried over, ... 15,921 9 11

1860.

1861.

Brought over,...

5,858 6 3

2,718 15 9

MUSEUM—Continued.

Two Teak wood Racks and two Teak
wood Wall Frames for Ethnogra-
phical Heads, ...
Repairing Brass Heads and Wooden
Frames of the Casts, ...

225 0 0

10 0 0

6,065 1 3 ————— 6,093 6 3

SECRETARY'S OFFICE,

General Establishment, ...
Secretary's Office Establishment,
Purchase of Postage Stamps,
Extra Writer's Salary, ...
A Sheet Almanac for 1861,
Bearing Postage, ...
Repairing a Lever Embossing Press,
A Blank Ledger Book, ...
Three Blank Books, ...
Printing Charges, ...
Stationery, ...
Petty Charges, ...

774 0 0

820 0 0

41 6 6

20 0 0

1 8 0

7 7 0

4 0 0

28 0 0

9 0 0

24 0 0

98 14 6

12 7 9

1,745 5 9 ————— 1,840 11 9

VESTED FUND, ...

Paid Commission upon Interest on the
Government Securities,
Ditto Income Tax on ditto,

0 9 6

9 10 0

5 6 7 ————— 10 3 6

COIN FUND, ...

Purchase of Coins, ...

191 8 0

306 12 0 ————— 191 8 0

INCOME TAX, ...

Paid Income Tax on Mr. E. Blyth's
Salary from December, 1860 to No-
vember, 1861 for 12 months at 10 Rs.
per month, ...

120 0 0

50 0 0 ————— 120 0 0

MESSRS. WILLIAMS AND NORGATE,
Paid Freight for sending back 16 Copies
of Muller's Buddhism, ...

3 0 0

Ditto Rev. C. B. Lewis as per their
Order, ...

260 0 0

Ditto Messrs. Gillanders, Arbuthnot &
Co. as per do. ...

1,000 0 0

1,000 0 0 ————— 1,263 0 0

BUILDING, ...

Assessment, ...
Ditto for Lighting, ...
Repairing, ...

270 0 0

72 0 0

53 2 0

392 2 0 ————— 395 2 0

MISCELLANEOUS, ...

Advertising Charges, ...
Meeting Charges, ...
Salary of a Ticca Mally, ...
Repairing an Argand Lamp,
Ditto old Rattan Mats, ...
Paid for a dozen Sissoo Wood Chairs,

23 4 0

164 0 0

42 7 6

5 8 0

7 4 0

66 0 0

Carried over, ... 308 7 6 12,632 15 3

Brought over,... 15,921 9 11

Co.'s Rs....	15,921	9	11
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Examined.

LALGOPAL DUTT,
Assistant Secretary.

Asiatic Society's Rooms,
The 31st Dec. 1861.

1860.

1861.

Brought over, .. 12,632 15 3
308 7 6

MISCELLANEOUS—Continued.

Paid fee to the Bank of Bengal for
Stamping Cheques, ...

1 9 0

Purchasing an 8-day Clock by Murray,
No. 1337, ...

190 0 0

Petty Charges, ...

21 14 6

636 12 0

521 15 0

DEPOSIT, ...

Baboo Nobin Chunder Roy, ...

9 10 0

W. A. D. Anley, Esq. ...

12 0 0

J. P. Grant, Esq. Jr. ...

24 0 0

G. Shelverton, Esq. ...

12 0 0

John Strachey, Esq. ...

6 0 0

Rajah Bunsput Singha, ...

12 0 0

G. H. M. Batten, Esq. ...

12 0 0

Harry Duhan, Esq. ...

18 0 0

R. H. Russell, Esq. ...

18 0 0

C. H. Barnes, Esq. ...

12 0 0

Capt. E. L. Earle, ...

12 0 0

Major J. T. Walker, ...

12 0 0

Baboo Sumbhoo Chunder Roy, ...

44 0 0

Capt J. C. Haughton, ...

6 0 0

C. J. Campbell, Esq. ...

12 0 0

W. T. Dodsworth, Esq. ...

6 0 0

R. H. M. Warrand, Esq....

6 0 0

Moonshee Narain Doss, ...

2 8 0

Baboo Rooder Nauth Doss, ...

2 0 0

Lt. C. J. Terrot, ...

2 0 0

E. Blyth, Esq. ...

65 0 0

191 12 0

305 2 0

BALANCE.

Bank of Bengal, ...

2,212 10 11

Cash in hand, ...

65 15 9

Inefficient Balance, ...

182 15 0

2,461 9 8

Co.'s Rs. 15,921 9 11

W. S. ATKINSON,

Secretary, Asiatic Society.

STATEMENT,
Abstract of the Oriental

	1860.	1861.
SALE OF ORIENTAL PUBLICATIONS,		
Received by sale of Bibliotheca Indica,	731 4 9	
Ditto by subscriptions to ditto,	52 8 0	
Ditto by sale of White Yajur Veda,	94 0 0	
	950 5 9	877 12 9
GOVERNMENT ALLOWANCE,		
Received from the General Treasury at 500 Rs. per month, 12 months,	6,000 0 0	6,000 0 0
VESTED FUND, ...		
Received Interest on Government Securities from the Bank of Bengal,	440 0 0	
	625 2 5	440 0 0
CUSTODY OF ORIENTAL WORKS,		
Savings and Establishment,	6 6 3	
	8 1 9	6 6 3
BIBLIOTHECA INDICA.		
Refund of Postage Stamps,	1 0 0	
		1 0 0

Carried over, 7,325 3 0

No. 2.

Fund for the year 1861.

	1860.	1861.
SALE OF ORIENTAL PUBLICATIONS,		
Commission on the Sale of Books,	175 10 9	
	6 14 9	175 10 9
VESTED FUND, ..		
Commisson upon Interest on Govern-		
ment Securities, ...	1 0 11	
Income Tax on ditto, ...	17 8 0	
	6,215 3 2	18 8 11
CUSTODY OF ORIENTAL WORKS,		
Salary of Librarian at Rs. 30 per		
month, ...	360 0 0	
Establishment at Rs. 14 per month,	168 0 0	
Book-binding, ...	153 6 0	
Books cleaning, ...	67 0 0	
Extra Writer's Salary,...	10 0 0	
Extra Moonshee's Salary,	45 0 0	
Banghee Expenses, ...	22 13 0	
A new mat for the Oriental Library		
Room, ...	26 14 0	
Stamp fee paid to the Bank of Bengal		
for Blank Stamped Cheques,	1 9 0	
Packing charges, ...	1 5 0	
Petty charges, ...	8 2 0	
	735 11 9	864 1 0
BIBLIOTHECA INDICA,		
Freight, ...	29 12 0	
Packing charges, ...	21 8 0	
Purchase of Postage Stamps,	11 13 0	
Petty charges, ...	3 3 3	
	38 8 9	66 4 3
LIBRARY, ...		
Purchasing Books, ...	94 8 0	
	30 0 0	94 8 0
COPYING MSS., ...		
Copying charges, ...	26 12 0	
	14 14 0	26 12 0
COPYING PURAN, ...		
Copying charges, ...	14 7 0	
	1 0 0	14 7 0
DICTIONARY OF TECHNICAL TERMS,		
Printing and Editing charges,	1,844 0 0	
	2,036 0 0	1,844 0 0
TARIKHI FEROZE SHAHI,		
Printing and Editing charges,	1,344 2 0	
	270 6 0	1,344 2 0
	Carried over,	4,448 5 11

				Brought over, 7,325 3 0		
BALANCE OF 1860.						
Bank of Bengal,	...	...		3,923	12	4
Cash in hand,	...	...			3	10 5
Inefficient Balance,	...	...	...	2,466	8	6
				<hr/> 6,393 15 3		

Co.'s Rs. 13,719 2 3

Examined.

LALGOPAL DUTT,
Assistant Secretary.

Asiatic Society's Rooms,
The 31st Dec., 1861.

	1860.	1861.
	Brought over,	4,448 5 11
MARCANDEYA PURANA.		
Editing charges, ...	120 0 0	
Printing charges, ...	697 8 0	
	<hr/>	817 8 0
SIDDHANTA SIROMANI.		
Preparing wood cuts of Diagrams,	151 0 0	
Printing charges, ...	250 0 0	
	<hr/>	401 0 0
NARADA PANCHARATRA.		
Editing charges, ...	40 0 0	
Printing charges, ...	232 8 0	
	<hr/>	272 8 0
SURYA SIDDHANTA, ...		
Preparing wood cuts of Diagrams,	10 0 0	
	<hr/>	10 0 0
VAIS'ESHIKA DARSANA.		
Editing charges, ...	500 0 0	
Printing charges, ...	1,194 6 0	
	<hr/>	1,694 6 0
TARIKHI BAIHAKI.		
Printing and editing charges,	584 0 0	
	<hr/>	584 0 0
SANHITA OF THE BLACK YAJUR VEDA,		
Printing charges, ...	452 6 0	
	<hr/>	452 6 0
WAKIDY, ...		
Printing and Editing charges,	292 0 0	
	<hr/>	292 0 0
SANDILYA SUTRAS.		
Printing charges, ...	189 0 0	
	<hr/>	189 0 0
VEDANTA SUTRAS.		
Printing charges, ...	450 0 0	
	<hr/>	450 0 0
TAITTIRIYA BRAHMANA,		
Printing charges, ...	448 0 0	
	<hr/>	448 0 0
DASARUPA.		
Printing charges, ...	245 14 0	
	<hr/>	245 14 0
BALANCE.		
Bank of Bengal, ...	915 7 5	
Cash in hand, ...	44 2 5	
Inefficient Balance, ...	2,454 8 6	
	<hr/>	3,414 2 4
	Co.'s Rs.	13,719 2 3
	<hr/>	<hr/>

W. S. ATKINSON,
Secretary, Asiatic Society.

STATEMENT No. 3.

Assets.

CASH.

	1860.	1861.
Bank of Bengal,	Rs. 1,654 13 2	2,212 10 11
Cash in hand,	85 7 6	65 15 9
Inefficient Balance,	250 12 6	182 15 0
Government Securities,	5,000 0 0	5,000 0 0

7,461 9 8

OUTSTANDINGS.

Contributions,	4,313 14 3	5,041 14 3
Admission fee,	352 0 0	448 0 0
Library, Sale of Books,	218 0 0	302 8 0
Journal Subscription,	531 3 3	509 2 3
Ditto Sale of,	32 0 0	24 4 0
Government allowance for December, 1861,	300 0 0	300 0 0

6,625 12 6

Liabilities.

	1860.	1861.
Hon'ble Sir J. W. Colvile, Kt.,	Rs. 276 8 0	276 8 0
J. W. Laidley, Esq.,	418 7 4	418 7 4
Deposits,	96 9 0	489 10 0
Messrs. Williams and Norgate,	647 11 11	356 0 0
Salary, Establishment and Contingent Charges, say,	700 0 0	700 0 0
Journal No. IV. of 1860 and Nos. I. to IV. of 1861, Printing Charges,	300 0 0	1,716 8 0
Extra Copies of Journal, say,	0 0 0	330 0 0
Subscription to the Oriental Translation Fund, £21,	0 0 0	210 0 0
Birds' Catalogue (Binding),	42 4 0	42 4 0

4,539 5 4

W. S. ATKINSON,
Secretary, Asiatic Society.

Examined.

LALGOPAL DUTT,
Assistant Secretary.

LIST OF ORDINARY MEMBERS
OF THE
ASIATIC SOCIETY OF BENGAL,
ON THE 31ST DECEMBER, 1861.

The * distinguishes non-subscribing and the † non-resident Members.

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- †Abbott, Lieut.-Col. J., Artillery, Delhi.  
Abdool Luteef, Khan, Bahadur, Maulvi, Calcutta.  
†Ahmed, Saiyid, Khan Bahadur, Moradabad.  
†Aitchison, J. E. T. Esquire, M. D., Jhelum.  
\*Alabaster, C. Esquire, China.  
\*Allen, C. Esquire, B. C. S., Europe.  
Amir Ali, Khan, Maulvi, Calcutta.  
\*Anderson, Lieut.-Col. W., Bengal Artillery, Europe.  
Anderson, T. Esquire, M. D., F. L. S., Botanical Garden, Calcutta.  
†Anley, W. A. D. Esquire, Rajmehal.  
Archer, Dr. C., Calcutta.  
As'ghur Ali, Saiyid, Khan Bahadur, Nawab, Calcutta.  
Asphar, J. J. T. H. Esquire, Calcutta.  
Atkinson, W. S. Esquire, M. A., F. L. S., Calcutta.  
Atkinson, Lieut.-Col. F. D., Calcutta.  
†Austen, Capt. H. G., H. M.'s 24th foot Surv. Genl's. Dept., Dera  
Dhoon.  
Avdall, J. Esquire, Calcutta.  
\*Baker, Col. W. E., Bengal Engineers, Europe.  
Banerjee, Rev. K. M., Calcutta.  
†Barnes, C. H. Esquire, Bhagulpore.  
†Batten, J. H. Esquire, B. C. S., Mynipore.  
†Batten, G. H. M. Esquire, B. C. S., Allyghur.  
Bayley, E. C. Esquire, B. C. S., Calcutta.  
†Bayley, S. C. Esquire, B. C. S., Patna.

- Beadon, Honorable C., B. C. S., Calcutta.  
Beaufort, F. L. Esquire, B. C. S., Calcutta.  
Beavan, Lieut. R. C. late 62nd B. N. I., Calcutta.  
\*Beckwith, J. Esquire, Europe.  
Bell, H. Esquire, B. A., B. C. S., Calcutta.  
\*Benson, Lieut.-Col. R., Europe.  
Birch, Major Genl. Sir R. J. H., K. C. B., Calcutta.  
†Blagrove, Capt. T. C. 26th Regt. B. N. I., Lahore.  
Blane, Lieut.-Col. S. J., Calcutta.  
\*Blanford, H. F., Esquire, Geological Survey, Europe.  
†Blanford, W. T. Esquire, Geological Survey, Burmah.  
†Blundell, E. A. Esquire, Singapore.  
\*Bogle, Lieut.-Col. Sir A. Kt., Europe.  
Bolie Chand Sing, Bábu, Calcutta.  
†Boulnois, C. Esquire, B. A., Krishnagur.  
Bowring, L. B. Esquire, B. C. S., Calcutta.  
\*Boycott, Dr. T., B. M. S., Europe.  
Braddon, H. Esquire, Calcutta.  
†Brandis, Dr. D., Rangoon.  
†Brandrith, J. E. L. Esquire, Delhi.  
\*Brodie, Capt. T. 5th Regt. B. N. I., Europe.  
Brown, J. Esquire, M. D., B. M. S., Calcutta.  
†Browne, Horace A., Capt., Pegu.  
Browne, Rev. J. Cave, M. A., Calcutta.  
†Bunsput Sinha, Rajah, Allahabad.  
\*Burn, Rev. T. H., M. A., Europe.  
Busheerooddeen Sultan Mohammed, Saheb, Chinsurah.  
Byrne, L. F. Esquire, C. E., Calcutta.  
Calcutta, Rt. Rev. Lord Bishop of, Calcutta.  
†Campbell, Dr. A., Darjiling.  
†Campbell, C. J. Esquire, C. E., Delhi.  
†Carnac, J. H. Rivett, Esquire, B. C. S., Burdwan.  
\*Chapman, R. B. Esquire, B. C. S., Europe.  
†Christian, J. Esquire, Monghyr.  
†Cockburn, J. F. Esquire, C. E., Kurhurbali Colliery.  
\*Colvin, J. H. B. Esquire, B. C. S., Europe.  
†Cooper, F. H. Esquire, B. C. S., Delhi.  
Cowell, E. B. Esquire, M. A., Calcutta.



- Crockett, Oliver R. Esquire, Calcutta.  
Crozier, Dr. William, B. M. S., Calcutta.  
†Dalton, Major E. S. 9th Regt. B. N. I., Chota Nagpore.  
†Davies, R. H. Esquire, B. C. S., Punjab.  
Davidson, Capt. E., Bengal Engineers, Calcutta.  
†Davey, N. T. Esquire, Revenue Survey, Dacca.  
†De Bourbel, Capt. R., Bengal Engineers, Allahabad.  
Digumber Mitra, Bábu, Calcutta.  
†Denison, His Excellency, Sir William, K. C. B., Madras.  
Devereux, Hon'ble H. B., B. C. S., Calcutta.  
\*Dickens, Lieut.-Col. C. H., Europe.  
†Dodsworth, W. T. Esquire, Dera Dhoon.  
Douglas, Lieut.-Col. C., Calcutta.  
Drummond, Hon'ble E., B. C. S., Calcutta.  
†Duhan, H. Esquire, G. T. Survey, Dera Dhoon.  
†Duka, Dr. T., Monghyr.  
†Earle, Capt. E. L., Bengal Artillery, Kurnal.  
\*Eatwell, Dr. W. C. B., Europe.  
\*Edgeworth, M. P. Esquire, B. C. S., Europe.  
†Edmonstone, Hon'ble G. F., B. C. S., Allahabad.  
\*Elliott, Hon'ble Walter, M. C. S., Europe.  
†Elliott, C. A. Esquire, B. C. S., Cawnpore.  
\*Ellis, Lieut.-Col. R. R., 23rd Regt. B. N. I., Europe.  
\*Elphinstone, Lieut. N. W. 4th Regt. B. N. I., Europe.  
Erskine, Hon'ble C. J., Bombay C. S., Calcutta.  
†Erskine, Major W. C., Jabalpur.  
Fayrer, Dr. J., B. M. S., Calcutta.  
Fisher, A. Esquire, Calcutta.  
Fitzgerald, Capt. C. M., Calcutta.  
†Fitzpatrick, D. Esquire, B. C. S., Umritsur.  
Fitzwilliam, W. S. Esquire, Calcutta.  
†Forlong, Capt. J. G. R., Maulmein.  
†Forrest, R. Esquire, Civil Engineer, Dera Dhoon.  
†Fraser, Capt. A., Alguada Reef.  
Frere, Sir H. Bartle, K. C. B., Bombay C. S., Calcutta.  
†Fuller, Capt. A. R., Punjab.  
Futteh Ali, Maulvi, Calcutta.  
†Fytche, Lieut.-Col. A., 70th Regt. B. N. I., Maulmein.

- †Gardner, D. M., Esquire, B. C. S., Furrackabad.  
†Gastrell, Capt. J. E. 13th Regt. N. I. Revenue Surv., Furreedpore.  
†Geoghegan, J. Esquire, B. C. S., Moorshedabad.  
\*Gladstone, W. Esquire, Europe.  
Goodeve, E., Esquire, M. D., Calcutta.  
\*Gurú Churn Doss, Bábu, Jessore.  
†Goss, W. Forbes, Esquire, Nya Doomkah, Beerbhoom.  
Govin Chunder Sen, Bábu, Calcutta.  
Grant, Hon'ble J. P., B. C. S., Calcutta.  
Grant, J. P., Jr. Esquire, B. C. S., Howrah.  
\*Grant, T. R., Esquire, Europe.  
\*Grapel, W. Esquire, M. A., Europe.  
†Gray, I. I., Esquire, Maldah.  
Grey, W., Esquire, B. C. S., Calcutta.  
†Griffin, L., Esquire, B. C. S., Lahore.  
†Griffith, R. T. H., Esquire, Benares.  
Grote, A., Esquire, B. C. S., F. L. S., Calcutta.  
Growse, F. S., Esquire, B. C. S., Calcutta.  
†Hall, F. E., Esquire, M. A., D. C. L., Saugor.  
Halleur, Dr. H., Calcutta.  
\*Hamilton, R., Esquire, China.  
\*Hamilton, Sir R. N. E. Bart., B. C. S., Europe.  
Hannyngton, Col. J. C., 63rd Regt. N. I., Calcutta.  
\*Hardie, Dr. G. K., Europe.  
†Harris, E. B., Esquire, Civil Surgeon, Monghyr.  
†Harrison, A. S., Esquire, B. A., Behar.  
†Haughton, Major J. C., Port Blair.  
\*Hearsay, Major Genl. Sir J. B., K. C. B., Europe.  
†Henessey, J. B. N., Esquire, Dera Dhoon.  
†Herschel, W. J., Esquire, B. C. S., Nuddea.  
\*Hichens, Lieut. W., Bengal Engineers, Europe.  
\*Hobhouse, C. P., Esquire, B. C. S., Europe.  
†Hopkinson, Major H., Assam.  
†Hovenden, Major J. J., Bengal Engineers, Gwalior.  
†Innes, Major J. J. M., Punjab.  
†Ishureepersad Singh, Rajah, Bahadur, Benares.  
†Jackson, L. S., Esquire, B. C. S., Rajshahi.  
\*Jackson, W. B., Esquire, B. C. S., Europe.

- Jadava Krishna Singh, Bábu, Calcutta.  
Jallaluddin Mohammed, Prince of Mysore, Calcutta.  
†James, Major H. C. 32nd Regt. B. N. I., Berhampore.  
†James, Major H. R., C. B., Peshawur.  
Jerdon, T. C., Esquire, M. M. S., Calcutta.  
†Jogindra Narain Roy, Bábu, Rajshai.  
\*Johnstone, J., Esquire, Europe.  
Jones, R., Esquire, Calcutta.  
Joygopaul Bysack, Bábu, Calcutta.  
Judge, T. E. B., Esquire, Calcutta.  
†Kabeerooddeen Ahmed Shah, Bahadoor, Sasseram.  
Kaliprosonno Singh, Bábu, Calcutta.  
Kásinath Roy Chowdry, Bábu, Calcutta.  
Kay, Rev. W., D. D., Calcutta.  
†Kempson, M., Esquire, M. A., Bareilly.  
†Khazim Ali Mohammed, Khan Nawab, Bahadur, Rampore.  
\*Laidlay, J. W., Esquire, Europe.  
Laing, Hon'ble S., Calcutta.  
†Layard, Major F. P., Bhagulpore.  
Lees, Capt. W. N., LL. D., Calcutta.  
Leonard, H., Esquire, C. E., Calcutta.  
\*Liebig, Dr. G. Von., B. M. S., Europe.  
Lindsay, E. J., Esquire, Calcutta.  
†Lloyd, Capt. M., Tounghoo.  
Loch, G., Esquire B. C. S., Calcutta.  
\*Low, Major Genl. J., Europe.  
†Lumsden, Major P. S., Peshawar.  
†Lushington, F. A., Esquire, B. C. S., Rajshahi.  
Macfarlane, D. H., Esquire, Calcutta.  
†Maclagan, Lieut.-Col. R., Lahore.  
Macrae, Dr. A. C., B. M. S., Calcutta.  
Mair, D. K., Esquire, Calcutta.  
Manickjee Rustomjee, Esquire, Calcutta.  
†Mán Singh, Maharájah, Báhádur, Oude.  
†Man, E. G., Esquire, Moorshedabad.  
\*Marshman, J. C., Esquire, Europe.  
Mazuchelli, Rev. F. F., D. D., Calcutta.  
McCrindle, J. W., Esquire, M. A., Calcutta.



- †McLeod, D. F., Esquire., C. B., B. C. S., Punjab.  
†Medlicott, J. G., Esquire, B. A., Geological Survey of India.  
†Medlieott, H. B., Esquire, F. G. S., Roorkee.  
†Melville, Capt. A. B., late 67th N. I., Surveyor General's Dept., Dera  
Dhoon.  
\*Middleton, J., Esquire, Europe.  
\*Mills, A. J. M., Esquire, B. C. S., Europe.  
\*Money, D. J., Esquire, B. C. S., Europe.  
Money, A., Esquire, B. C. S., Bhagulpore.  
Money, J. W. B., Esquire, Caleutta.  
†Montgomerie, Capt. T. G., B. E., F. R. G. S., Trigl. Survey, Dera  
Dhoon.  
†Morris, G. G., Esquire, B. C. S., Dinagepore.  
†Muir, W., Esquire, B. C. S., Allahabad.  
\*Muir, J., Esquire, Europe.  
†Murray, Lieut. W. G., 68th N. I., Rawul Pindee.  
†Narendra Narain Bhupa, Mahárájah, Cooch Behar.  
†Newmareh, Major C. D., Pegu.  
†Nicholls, Capt. W. T., 24th Regt. M. N. I., Burmah.  
Nundolala Bose, Bábu, Caleutta.  
Obbard, J., Esquire, Caleutta.  
Oldham, C., Esquire, Geological Survey of India.  
Oldham, T., Esquire, LL. D., F. R. S., F. Calcutta.  
O'Shaughnessy, Sir W. B., Europe.  
\*Ouseley, Major W. R., Europe.  
†Pearse, Major G. G., Segowlie.  
†Pelly, Capt. L., Bombay Army, Zanzibar.  
†Phayre, Lieut.-Col. A., Rangoon.  
†Prasunnonath Roy, Rajah Bahadoor, Degaputti, Rajshai.  
Pratápehandra Siñha, Rajah, Calcutta.  
Pratt, Ven'ble Archdeacon, J. H., M. A., Calcutta.  
Preonath Sett, Bábu, Caleutta.  
\*Prinsep, C. R., Esquire, Europe.  
Prosonno Coomar Tagore, Bábu, Calcutta.  
Rádhanáth Sikdar, Bábu, Calcutta.  
Rajendra Dutt, Bábu, Calcutta.  
Rajendralál Mitra, Bábu, Caleutta.  
Ramánáth Tagore, Bábu, Calcutta.

Ramáprasád Roy, Bábu, Calcutta.

Rámgopál Ghose, Bábu, Calcutta.

†Reid, H. S., Esquire, B. C. S., Nainetal.

\*Riddell, H. B., Esquire, B. C. S., Europe.

†Riley, E. O., Esquire, F. G. S., Bassein.

Ritchie, Hon'ble, W., M. A., Calcutta,

\*Roberts, A., Esquire, B. C. S., Europe.

\*Röer, Dr. E., Europe.

\*Rogers, Capt. T. E., Europe.

Ross, Capt. W. A., 2nd Brigade, Royal Artillery, Calcutta.

†Russell, A. E., Esquire, B. C. S., Moorshedabad.

†Russell, R. H., Esquire, B. C. S., Tipperah.

Sampson, A. B., Esquire, B. A., Calcutta.

Sanders, J., Esquire, Calcutta.

†Saunders, C. B., Esquire, B. C. S., Bangalore.

†Saxton, Capt. J. H., 38th M. N. I., Cuttack.

Schiller, F., Esquire, Calcutta.

Scott, Col. E. W. S., Calcutta.

†Scott, W. H., Esquire, Dera Dhoon.

†Shelverton, G. Esquire, Dera Dhoon.

\*Sherwill, Lieut.-Col., W. S., 66th Regt. B. N. I., F. G. S., F. R. G. S.,  
Europe.

†Sherwill, Major J., Darjiling.

†Shumbhoo Chunder Roy, Bábu, Zeminder, Rungpur.

Simpson, Dr. B., Calcutta.

\*Smith, Col. J. F., Europe.

Smith, H. Scott, Esquire, B. A., Calcutta.

†Spankie, R., Esquire, B. C. S., Futtehghur.

Stainforth, H., Esquire, B. C. S., Calcutta.

†Stanton, Capt. F. S., Bengal Engineers, Sherghotty.

\*Stephen, Major, J. G., 8th N. I., Europe.

†Stewart, Major P., Bengal Engineers, N. W. Provinces.

†Stewart, Lieut. W. J., Bengal Artillery, Rev. Survey, Burrisal.

\*Strachey, Lieut.-Col. R., F. R. S., F. L. S., F. G. S., Europe.

†Strachey, J., Esquire, B. C. S., Moradabad.

†Stubbs, Capt. F. W., Bengal Artillery, Rawul Pindee.

†Sudderooddeen, Moonshee, Pandooah.

†Sutherland, H. C., Esquire, B. C. S., Dacca.

†Suttischunder Roy, Maharajah, Krishnagore.

Suttyasharana Ghosal, Rajah, Bhookylas, Calcutta.

Temple, R., Esquire, B. C. S., Calcutta.

†Theobald, W., Jr., Esquire, Geological Survey of India, Allahabad.

Thomson, J. G., Esquire, Calcutta.

\*Thomson, Dr. T., M. D., F. R. S., F. L. S., F. R. G. S., Europe.

Thompson, Rev. J. C., Calcutta.

†Thornhill, C. B., Esquire, B. C. S., Allahabad.

Thuillier, Lieut.-Col. H. L., Bengal Artillery, F. R. G. S., Calcutta.

†Tickell, Major S. R., Maulmein.

Tremlett, J. D., Esquire, B. C. S., Calcutta.

Trevor, C. B., Esquire, B. C. S., Calcutta.

†Turnbull, Lieut.-Col. A. D., Roorkee.

Tween, A., Esquire, Geological Survey, Calcutta.

†Vanrenen, Capt. A. D., late 71st B. N. I., R. Survey, Jhansie.

Walagohur Mohammed Sahebzadah, Calcutta.

†Walker, Major J. T., Bombay Engineers, Mussooree.

\*Ward, J. J., Esquire, B. C. S., Europe.

†Warrand, R. H. M., Esquire, B. C. S., Muttra.

\*Watson, J., Esquire, B. C. S., Europe.

Wauchope, S., Esquire, B. C. S., Calcutta.

\*Waugh, Col. A. S., Engineers, F. R. S., F. R. G. S., Europe.

Wells, Hon'ble Sir Mordaunt, Kt., Calcutta.

†Williams, Dr. C., H. M.'s 68th Regt., Thyet Myo.

†Wilmot, C. W., Esquire, Pakour.

†Wilson, W. L., Esquire, Beerbhoom.

Woodrow, H., Esquire, M. A., Calcutta.

\*Wortley, Major A. H. P., Europe.

\*Young, Lieut.-Col. C. B., Europe.

Yule, Lieut.-Col. H., Calcutta.

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#### ELECTIONS IN 1861.

Hon'ble C. J. Erskine, Bombay C. S., Calcutta.

W. T. Dodsworth, Esq., Dera Dhoon.

L. S. Jackson, Esq., B. C. S., Rajshahi.



Capt. H. G. Austin, H. M.'s 24th foot, Surv. Genl.'s Dept., Dera Dhoon.

Capt. A. B. Melville, late 67th N. I. Surveyor Genl.'s Dept., Dera Dhoon.

Lieut. W. J. Stewart, Bengal Artillery, R. Surv., Burrisal.

R. Forrest, Esq., Civil Engineer, Dera Dhoon.

H. Duhan, Esq., G. T. Survey, Dera Dhoon.

S. C. Bayley, Esq., B. C. S., Patna.

A. S. Harrison, Esq., B. A., Behar.

F. S. Growse, Esq., B. C. S., Calcutta.

J. Brown, Esq., M. D., B. M. S., Calcutta.

H. Bell, Esq., B. A., B. C. S., Calcutta.

Major W. E. Warrand, Calcutta.

C. Boulnois, Esq., B. A., Krishnagur.

Hon'ble S. Laing, Calcutta.

Hon'ble H. B. Devereux, B. C. S., Calcutta.

N. T. Davey, Esq., Revenue Survey, Dacca.

C. H. Barnes, Esq., Bhagulpore.

J. J. Gray, Esq., Maldah.

Major P. S. Lumsden, Peshawar.

Rev. T. H. Burn, M. A., Calcutta.

T. Anderson, Esq., M. D., F. L. S., Botanic Garden, Calcutta.

Major J. T. Walker, Mussooree.

Capt. E. L. Earle, Bengal Artillery, Kurnal.

His Excellency Sir W. Denison, K. C. B., Madras.

Maharájah Mán Singh, Báhádur, Oude.

J. D. Tremlett, Esq., B. C. S., Calcutta.

Capt. L. Pelly, Bombay Army, Zanzibar.

J. J. T. H. Asphar, Esq., Calcutta.

O. R. Crockett, Esq., Calcutta.

J. W. McCrindle, Esq., M. A., Calcutta.

Nawab Mohammed Khazim Ali Khan, Báhádur, Rampore.

Lieut. R. C. Beavan, Late 62nd B. N. I., Calcutta.

L. Griffin, Esq., B. C. S., Lahore.

Capt. E. Davidson, Bengal Engineers, Calcutta.

Nawab Syud As'ghur Ali Khan, Bahadur, Calcutta.

J. F. Cockburn, Esq., C. E., Kurhurbali Colliery.

Capt. A. R. Fuller, Punjab.

Major P. Stewart, Bengal Engineers, N. W. Provinces.  
A. Tween, Esq., Geological Survey, Calcutta.  
Baboo Shumbhoo Chunder Roy, Zeminder, Rungpore.  
Dr. C. Williams, H. M.'s 68th Regt., Thyet Myo.  
Sahebzádah Mohammed Walagohur, Calcutta.  
Moonshee Sudderoodeen, Punduah.  
Capt. M. Lloyd, Tounghoo.  
R. H. Davies, Esq., B. C. S., Punjab.  
Capt. W. A. Ross, 2nd Brigade, Royal Artillery, Calcutta.  
M. Kempson, Esq., M. A., Bareilly.  
C. B. Saunders, Esq., B. C. S., Bangalore.  
Major H. R. James, C. B., Peshawur.

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CORRESPONDING MEMBER.

Dr. R. Gosche, Berlin.

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LOSS OF MEMBERS DURING THE YEAR, 1861.

*By retirement.*

C. G. Wray, Esq., Calcutta.  
F. F. Williams, Esq., Calcutta.  
Lieut. H. Sconce, Assam.  
Lieut. W. G. Alexander, 93rd Highlanders, Pillibheet.  
Major W. E. Warrand, Calcutta.  
Rev. W. Ayerst, Calcutta.  
Major T. James, Calcutta.  
Dr. A. J. Payne, Calcutta.  
W. S. Halsey, Esq., B. C. S., Mirzápore.

*By death.*

G. H. Freeling, Esq., B. C. S., Bolundshur.  
Col. R. Baird Smith, C. B., Calcutta.

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LIST OF HONORARY MEMBERS.

M. Garcin de Tassy, Membre de l' Institut, Paris.  
Sir John Phillippart, London.  
Count De Noe, Paris.

Prof. Francis Bopp, Memb. de l' Academie de Berlin.  
Sir J. F. W. Herschel, F. R. S., London.  
Col. W. H. Sykes, F. R. S., London.  
Prof. Lea, Philadelphia.  
Prof. C. Lassen, Bonn.  
M. Reinaud, Memb. de l' Institut., Prof. de l' Arabe, Paris.  
Dr. Ewald, Gottingen.  
His Highness Hekekyan Bey, Egypt.  
Right Hon'ble Sir Edward Ryan, Kt., London.  
Prof. Jules Mohl, Memb. de l' Institut., Paris.  
Col. W. Munro, London,  
His Highness the Nawab Nazim of Bengal, Moorshedabad.  
Dr. J. D. Hooker, F. R. S., London.  
Prof. Henry, Princeton, United States.  
Major General Sir Henry C. Rawlinson, K. C B., D. C. L., F. R. S.,  
F. R. G. S., London.  
Col. Sir Proby T. Cautley, K. C. B., F. R. S., London.  
Rájá Rádhákánta Deva, Báhádur, Calcutta.  
B. H. Hodgson, Esq., Europe.  
Dr. H. Falconer, F. R. S., B. M. S., Europe.  
Rt. Hon'ble Sir J. W. Colvile, Kt., Europe.  
Prof. Max Muller, Oxford.  
Mons. Stanislas Julien, Paris,  
Col. Sir George Everest, C. B., F. R. S., Europe.  
Dr. Robert Wight, London.  
Edward Thomas, Esq., Europe.  
Dr. Aloys Sprenger, Germany.  
Dr. Albrecht Weber, Berlin.

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LIST OF CORRESPONDING MEMBERS.

Kremer, Mons. A. Von, Alexandria.  
Porter, Rev. J., Damascus.  
Schlagintweit, Herr H., Berlin.  
Schlagintweit, Herr R., Do.  
Smith, Dr. E., Beyrout.  
Tailor, J. Esq., Bussorah.  
Wilson, Dr., Bombay.



Nietner, J. Esq., Colombo, Ceylon.

Haug, Dr. M., Poonah.

Bleeker, Dr. P., Batavia.

Frederick, Dr. H., Batavia.

Baker, Rev. H., Alipi, East Malabar.

Swinhoe, R. Esq., H. M. Consulate, Amoy.

Gosche, Dr. R., Berlin.

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LIST OF ASSOCIATE MEMBERS.

Blyth, E. Esq., Calcutta.

Karámut Ali, Saiyid, Matawalli, Húgli.

Long, Rev. J., Calcutta.

MacGowan, Rev. J., Europe.

Stephenson, J. Esq., Europe.

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## FEBRUARY, 1862.

The monthly general meeting of the Asiatic Society was held on the 5th instant.

A. Grote, Esq. president, in the chair.

Presentations were received—

1. From the National Museum at Melbourne, a considerable collection of Australian birds and mammals.

2. From Mr. W. T. Blanford, some specimens of birds and fishes from Burmah.

3. From Captain W. A. Ross, a model of a tin stamping machine in use in Cornwall.

4. From the Surveyor General, several copies of a panoramic view of Kashmir, prepared by Captain T. G. Montgomerie.

5. From the Superintendent, Geological Survey of India, a copy of the memoirs of the Survey, containing the first part of "*Palæontologia Indica*."

6. From the widow of the late Mr. G. H. Freeling, through Captain Davidson, Vols. 3, 4, 9, 10, 11, 12, 13 and 19, of the *Journal of the Asiatic Society*.

7. From the Superintendent of the Barrackpore Park Menagerie, a dead Giraffe.

8. From M. Biot, through Reverend J. Carbonel, copies of his work on Indian Astronomy and his Review of Reverend Mr. Burgess' translation of the *Surya Siddhanta*.

9. From the Bombay Royal Asiatic Society, a copy of the *Journal*, Vol. VI. No. 21 of the Society.

10. From Mr. W. Matthews, through Capt. J. R. Pollock, a small collection of coins.

11. From Nawab Mehdee Ali Khan Bahadoor, a copy of *Diwan Nazim*, by His Highness Mohammed Yusoof Ali Khan of Rampore, K. S. I.

12. From the Bombay Government, a copy of the *Magnetical and Meteorological Observations* made at the Bombay Observatory in 1860.

13. From the Syndicate of the Cambridge Observatory, a copy of *Astronomical observations* made at the Cambridge Observatory for the years 1852, 1853, and 1854.

Rev. J. Long exhibited an image of Buddha found in some railway excavations near Monghyr.

The following gentlemen, duly proposed at the last meeting, were balloted for and elected ordinary members :—

Col. H. Torrens, Capt. E. Smyth, Baboo Gour Doss Bysack, and Col. C. S. Guthrie.

The following gentlemen were named for ballot as ordinary members at the next meeting :—

Dr. F. N. Macnamara, professor of Chemistry, Medical College, proposed by Mr. Atkinson, seconded by the President.

Lieut. J. Johnstone, Asst. Commissioner, Punjab, proposed by Mr. Bayley, seconded by the President.

Capt. D. G. Robinson, Bengal Engineers, proposed by Major Walker, seconded by Mr. Atkinson.

Capt. de la Chaumette, Royal Artillery, proposed by Mr. Atkinson, seconded by the President.

The Council proposed A. Murray, Esq., Secretary, Royal Horticultural Society of London, as a corresponding member.

The Council submitted the following report :—

“The Council beg to recommend that the Sutras of Jaimini should be published in the Bibl. Indica with Sabara’s commentary. Pundit Moheshchunder Nya Ratna has undertaken to edit it; the work will occupy not more than seven Fasciculi. During the past year we have published an edition of the Vais’eshika Sutras, and the present work will supply another *desideratum* in the ancient philosophy of India. The Purva Mimánsa has hitherto remained almost untouched by European scholarship, and we are sure that the publication of Jaimini’s Sutras will be welcomed in Europe as well as in India.”

The report was adopted.

The Council reported that they had appointed the following Sub-Committees for 1862.

#### FINANCE.

Babu Rajendralal Mitra and Dr. W. Crozier.

#### PHILOLOGY.

Babu Rajendralal Mitra; Capt. W. N. Lees; F. E. Hall, Esq.; E. C. Bayley, Esq.; Hon’ble C. J. Erskine and R. T. H. Griffith, Esq.

#### LIBRARY.

Babus Rajendralal Mitra and Ramaprasad Roy; Capt. W. N. Lees; Dr. J. Fayrer; R. Jones, Esq.; and Dr. T. Anderson.



## NATURAL HISTORY.

T. Oldham, Esq.; Dr. W. Crozier; Dr. T. Anderson; Dr. A. C. Macrae; W. Theobald, Esq., Jr.; J. G. Medlicott, Esq.; and Dr. J. Fayrer.

## METEOROLOGY AND PHYSICAL SCIENCES.

The Ven'ble J. H. Pratt; Lieut.-Col. H. L. Thuillier; Babu Radha Nath Sikdar; T. Oldham, Esq.; Dr. H. Halleur; and J. Obbard, Esq.

## COIN COMMITTEE.

Babu Rajendralal Mitra; E C. Bayley, Esq.; and Capt. W. N. Lees.

Communications were received—

1. From Major J. T. Walker, a paper on the Trigonometrical Survey of India.

2. From Babu Radha Nath Sikdar, Abstracts of Meteorological Observations taken at the Surveyor General's Office in July and August last.

Major Walker read a paper on recent additions to our geographical knowledge of districts bordering on the British frontier Trans-Indus.

He pointed out that there is a large tract of country west of the Soolimani range, and south of the Soofaid Koh, which lies beyond the reach of the topographical surveys of the Trans-Indus frontier and the route surveys between Khelat and Kabul, and is shown on all extant maps of the Punjab and Affghanistan as a *terra incognita*. It extends over 5° of latitude, and averages 2° in longitude, including an area of 50,000 square miles, which is nearly equal to that of England. The inhabitants are various tribes of Pathans and Beloochies, who are particularly suspicious of Europeans and jealous of admitting them into their country.

In 1840 Lieut. Broadfoot of the Engineers marched from Ghizni to Dera Ismail Khan, by the route along the course of the Gomul river. But it is believed that he travelled in disguise with a Kafila of Powin Das, or native merchants, and could not obtain more information of the country than an itinerary, which was necessarily meagre, because executed without instruments, and dependant only on estimated bearings and distances.

During the sixteen subsequent years no opportunity appears to have offered of obtaining additional information of these countries

from actual survey. But towards the end of 1856, it became necessary for the Punjab force, commanded by General Chamberlain, to proceed into the Koorum valley, in order to effect the restitution of property stolen by its inhabitants from British subjects. This valley lies on the direct road from Kohat to Ghizni, at the foot of the southern slopes of Soofaid Koh range. The inhabitants are chiefly Tooree Pathans, who are subject to the ruler of Kabul, and pay him revenue when he can send a force strong enough to collect it. His agents accompanied the expeditionary force, and are believed to have availed themselves of the opportunity to collect their master's dues under threats that they would otherwise turn the British troops against the recusants. The whole valley was peaceably surveyed as far west as the Paiwar pass immediately below the Seekaram mountain, the culminating point of the Soofaid Koh range, where it rises to an elevation of 15,640 feet above the sea. The pass is not on the watershed of the range, but is merely where the road crosses a large spur which can be avoided altogether by a circuitous route, through the Chum Kanni district to the south. It is about 7000 feet high, and derives its importance more from the populous and wealthy town of Paiwar at its foot than from its elevation. The Koorum river rises about 60 miles farther west among the Zoomut valleys, where the Soolimani range abuts at right angles against the Soofaid Koh.

In the spring of 1857, Col. Lumsden, his brother, and Dr. Bellew, started on their memorable expedition to Kandahar. Crossing the Paiwar Spur, they descended into the Kurryab valley occupied by Pathan Tribes of Jajis and Munguls until they reached the Hazardarakht Nuddi; or stream of the thousand trees, one of the principal confluent of the Koorum river. Following this to its source, they arrived at length at the Shooturgurdan or camel neck pass at a height of 11,400 feet, on the watershed which parts Jellalabad, Kabul and Ghizni from Kohat, Koorum and Wuzeeristan.

From this elevation they descended westwards through the valleys of the Sooliman Khel Ghilzies into the plains at the head of the Logur valley, south of Kabul, whence it is but four marches to Shekhabad and Saidabad on the main road between Kabul and Ghizni.

In the autumn of 1859, and again in the spring of the following year, the Punjab force under the command of General Chamberlain, was required to operate against the Wuzeries to check their propen-



sities for making raids into British territories. On the first occasion, the country of the Durwesh Khels was entered, and on the second that of the Mashoods. These are the two principal branches of the powerful Wuzeeri tribe, and are bounded, the former by Koorum Khost Zadran and the British frontier from Thull *viâ* Bunnoo to Noorum; the latter by the Gomul river and our frontier from Noorur to Gomul *viâ* the Bihin Durra and the town of Tâk.

During the course of the operations against these tribes, much valuable information was acquired, more particularly of the geography of the country as shown in the maps exhibited to the Society.

A glance at the map is sufficient to explain the plundering propensities of the Wuzeeries. The irrigated lands on which they chiefly depend for their cereals are merely narrow fillets on the edges, and often in the beds of the principal water-courses. Their united area probably does not amount to more than two or three per cent. of the whole district. There is no wonder, therefore, that the fanatic Mussulman mountaineers should readily bring themselves to believe, that there is a wild justice in their favourite pastime of plundering the inhabitants of the rich plains at their feet, and a duty they owe their families in obtaining forcible restitution of the rights which Heaven must have intended for Mussulmans rather than Hindoos, and for stalwart highlanders rather than the puny inhabitants of the plains. The rivers even when of considerable length, are usually dry for the greater portion of the year. There is little moisture to feed them in their parent mountains which are insignificant in mass and altitude compared with the Himalayas, are nearer the tropics and dessicated by heat radiated from the extensive plains east and west. Vegetation is scarce, the soil is dry and arid, pine trees are not to be met with at a lower elevation than 9000 feet, and the climate of any given altitude would find its equivalent in the Himalaya as 2 or 3000 feet nearer the sea level.

The thanks of the meeting were voted to Major Walker for his interesting communication.

The Curator submitted his report, in which were recorded numerous presentations to the Society's Museum, and exhibited a large series of the skulls of the Asiatic species of Rhinoceros. His remarks on this genus of *pachyderms* have since been embodied in a Memoir for publication in the Society's Journal. The true *Rhinoceros indicus*, it was



shewn, appeared to be peculiar to the *tarai* region at the foot of the Himalayas, and valley of the Brahmaputra river; the single-horned Rhinoceros of the Rajmahal hills, of the Bengal Sundarbáns, of the Indo-Chinese region and Malayan peninsula, being identical with *Rh. sondaicus* of Java and Borneo. The Asiatic two-horned species, *Rh. Sumatranus*, according to Mr. Blyth, was even more numerous in the Burmese countries than *Rh. sondaicus*; the range of this species extending northward at least to the latitude of Ramri island, upon the Ya-ma-doung range which separates the province of Arakan from that of Pegu (or the valley of the Irawádi). The Society's museum, as yet, contains not a single specimen of *Rh. indicus*; although abundantly supplied with skulls and other specimens of *Rh. sondaicus* and *Rh. Sumatranus*.

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FOR MARCH, 1862.

The monthly general meeting of the Asiatic Society was held on the 5th instant.

A. Grote, Esq., President, in the chair.

Presentations were received.

1. From Dr. T. Duka, through Babu Rajendralal Mitra, two specimens of impressions in baked clay of seals of the Buddhist creed found in an ancient *Chaitya* near Sultangunj, midway between Bhagulpore and Monghyr.

2. From Captain F. W. Stubbs, a considerable collection of fossil remains of mammalia, and shells from the salt range in the Punjab.

3. From the Under-Secretary, Government of India, two copies of an Andamanese vocabulary.

4. From Dr. Brandis, through Captain P. H. Power, two copies of a list of specimens of some Burman woods sent to England for the International Exhibition of 1862.

5. From the Secretary Smithsonian Institution several Nos. of the Transactions, Reports, and other publications of the Institution.

6. From the Royal University of Norway, several publications of the University.

7. From Dr. T. Anderson specimens of several species of fish.

Read a letter from the Under-Secretary, Government of India, forwarding copy of a letter from the Right Honorable the Secretary of State for India declining to comply with the request of the Society

that the Zoological catalogues of the India House Museum might be proceeded with.

The following gentlemen duly proposed at the last meeting were balloted for and elected ordinary members :—

Dr. F. N. Macnamara, Lieut. J. Johnstone, Capt. D. G. Robinson, Bengal Engineers, Capt. de la Chaumette, Royal Artillery.

Mr. A. Murray, Secretary Royal Horticultural Society of London, was also balloted for and elected a corresponding member.

The following gentlemen were named for ballot at the next meeting.

C. U. Aitchison, Esq., C. S., proposed by Mr. Bayley, seconded by Mr. Cowell.

F. A. E. Dalrymple, Esq., C. S., proposed by the President, seconded by Babu Ramaprasad Roy.

Lieut.-Col. H. W. Norman, C. B., Secretary, Government of India, Military Department, proposed by Colonel F. D. Atkinson, seconded by Mr. Atkinson.

Babu Rajkissen Roy, Zemindar of Berhampore, proposed by Babu Gour Doss Bysack, seconded by Mr. Atkinson.

J. A. P. Collis, Esq., M. D., proposed by Capt. F. W. Stubbs, seconded by Mr. Atkinson.

E. G. Glazier, Esq., C. S., proposed by the President, seconded by Mr. Atkinson.

Major H. Raban, Bengal Army, proposed by the President, seconded by Mr. Atkinson.

Communications were received.

1. From the Secretary, Government of India, Public Works Department, the following papers, connected with the appointment of Colonel A. Cunningham, to investigate the antiquities of Behar and other parts of Upper India.

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From LIEUT.-COL. H. YULE,

Secy, to the Govt. of India.

TO THE PRESIDENT OF THE ASIATIC SOCIETY,

Public Works Department,

*Fort William, 21st February, 1862.*

*General.*

Antiquities.

SIR,—I am directed by His Excellency the Governor-General in Council, to transmit for the information of the Society and for



publication in their Journal, papers connected with the appointment of Colonel Alexander Cunningham, to the investigation of antiquities of Behar and other parts of Upper India, a task for which he is known to be very highly qualified.

2. Colonel Cunningham has been at work in South Behar since the early part of December, and it is believed that his researches have already been rewarded by some important identifications of localities, mentioned in the ancient Buddhist writings.

I have, &c.,

(Sd.) H. YULE, Lieut.-Colonel,

*Secy. to the Govt. of India.*

Dated 22nd January, 1862.

*Minute by the Right Hon'ble the Governor General of India in Council on the Antiquities of Upper India.*

In November last, when at Allahabad, I had communications with Colonel A. Cunningham, then the Chief Engineer of the N. W. Provinces, regarding an investigation of the archæological remains of Upper India.

It is impossible to pass through that part, or indeed, so far as my experience goes, any part, of the British territories in India without being struck by the neglect with which the greater portion of the architectural remains, and of the traces of by-gone civilization have been treated, though many of these and some which have had least notice are full of beauty and interest.

By "neglect" I do not mean only the omission to restore them, or even to arrest their decay; for this would be a task, which in many cases, would require an expenditure of labour and money, far greater than any Government of India could reasonably bestow upon it.

But so far as the Government is concerned, there has been neglect of a much cheaper duty; that of investigating and placing on record, for the instruction of future generations, many particulars that might still be rescued from oblivion, and throw light upon the early history of England's great dependency; a history which, as time moves on, as the country becomes more easily accessible, and traversable, and as Englishmen are led to give more thought to India than such as barely suffices to hold it and govern it, will assuredly occupy, more and more, the attention of the intelligent and enquiring classes in European countries.



It will not be to our credit, as an enlightened ruling power, if we continue to allow such fields of investigation, as the remains of the old Buddhist capital in Behar, the plains round Delhi, studded with ruins more thickly than even the Campagna of Rome, and many others, to remain without more examination than they have hitherto received. Everything that has hitherto been done in this way, has been done by private persons, imperfectly and without system. It is impossible not to feel, that there are European Governments, which, if they had held our rule in India, would not have allowed this to be said.

It is true that in 1844, on a representation from the Royal Asiatic Society, and in 1847, in accordance with detailed suggestions from Lord Hardinge, the Court of Directors gave a liberal sanction to certain arrangements for examining, delineating, and recording some of the chief antiquities of India. But for one reason or another, mainly perhaps owing to the Officer entrusted with the task having other work to do, and owing to his early death, very little seems to have resulted from this endeavour. A few drawings of antiquities, and some remains, were transmitted to the India House, and some fifteen or twenty papers were contributed by Major Kittoe and Major Cunningham to the Journals of the Asiatic Society; but, so far as the Government is concerned, the scheme appears to have been lost sight of within two or three years of its adoption.

I enclose a memorandum drawn up by Col. Cunningham, who has, more than any other Officer on this side of India, made the antiquities of the country his study, and who has here sketched the course of proceeding which a more complete and systematic archæological investigation should, in his opinion, take.

I think it good,—and none the worse for being a beginning on a moderate scale. It will certainly cost very little in itself, and will commit the Government to no future or unforeseen expense. For it does not contemplate the spending of any money upon repairs and preservation. This, when done at all, should be done upon a separate and full consideration of any case which may seem to claim it. What is aimed at is an accurate description, illustrated by plans, measurements, drawings or photographs, and by copies of inscriptions, of such remains as most deserve notice with the history of them so far as it may be traceable, and a record of the traditions that are retained regarding them.

I propose that the work be entrusted to Colonel Cunningham, with the understanding that it continue during the present and the following cold season, by which time a fair judgment of its utility and interest may be formed. It may then be persevered in, and expanded, or otherwise dealt with as may seem good at the time.

Colonel Cunningham should receive Rs. 450 a month with Rs. 250 when in the field to defray the cost of making surveys and measurements and of other mechanical assistance. If something more should be necessary to obtain the services of a Native subordinate of the Medical or Public Works Department competent to take photographic views, it should be given.

It would be premature to determine how the results of Colonel Cunningham's labours should be dealt with, but whilst the Government would of course retain a proprietary right in them for its own purposes, I recommend that the interests of Colonel Cunningham should be considered in the terms upon which they may be furnished to the public.

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*Memorandum by Colonel A. Cunningham, of Engineers, regarding a proposed investigation of the Archæological remains of Upper India.*

During the one hundred years of British dominion in India, the Government has done little or nothing towards the preservation of its ancient monuments which, in the almost total absence of any written history, form the only reliable sources of information as to the early condition of the country. Some of these monuments have already endured for ages, and are likely to last for ages still to come; but there are many others which are daily suffering from the effects of time, and which must soon disappear altogether, unless preserved by the accurate drawings and faithful descriptions of the archæologist.

2. All that has hitherto been done towards the illustration of ancient Indian history has been due to the unaided efforts of private individuals. These researches consequently have always been desultory and unconnected, and frequently incomplete, owing partly to the short stay which individual officers usually make at any particular place, and partly to the limited leisure which could be devoted to such pursuits.

3. Hitherto the Government has been chiefly occupied with



the extension and consolidation of Empire ; but the establishment of the Trigonometrical Survey shows that it has not been unmindful of the claims of science. It would redound equally to the honor of the British Government to institute a careful and systematic investigation of all the existing monuments of ancient India.

4. In describing the ancient geography of India, the elder Pliny, for the sake of clearness, follows the footsteps of Alexander the Great. For a similar reason, in the present proposed investigation, I would follow the footsteps of the Chinese pilgrim Houen Thsang, who in the 7th century of our era, traversed India from west to east and back again, for the purpose of visiting all the famous sites of Buddhist history and tradition. In the account of his travels, although the Buddhist remains are described in most detail with all their attendant legends and traditions, yet the numbers and appearance of the Brahminical temples are also noted, and the travels of the Chinese pilgrim thus hold the same place in the history of India, which those of Pausanias hold in the history of Greece.

5. In the North Western Provinces and Behar the principal places to be visited and examined are the following, which are also shown in the accompanying sketch map :—

I. *Khalsi*, on the Jumna, where the river leaves the hills. At this place there still exists a large boulder stone, covered with one of Asoka's inscriptions, in which the names of Antiochus, Ptolemy, Antigonus, Magas, and Alexander are all recorded. This portion of the inscription, which on the rock of Kapurdigiri (in the Yusufzai plain,) and of Dhauli (in Cuttack) is much mutilated and abraded, is here in perfect preservation. A copy of this inscription and an account of the ruins would therefore be valuable.

II. *Hurdwar*, on the Ganges, with the opposite city of Mayurpoora.

III. *Mundore*, *Sumbhul*, and *Saswan*, in Rohilkund.

IV. *Karsana* near Khasgunj.

V. *Sunkissa*, between Mynpoorie and Futtehgurh, where it is known that many remains of Buddhism still exist. This was one of the most sacred places amongst the Buddhists.

VI. *Muttra*.—In one of the ancient mounds outside the city, the remains of a large monastery have been lately discovered. Numer-



ous statues, sculptured pillars, and inscribed bases of columns have been brought to light. Amongst these inscriptions, some, which are dated in an unknown era, are of special interest and value. They belong most probably to the first century of the Christian era and one of them records the name of the great King Huveshka, who is presumed to be the same as the Indo-Scythian King Hushka.

VII. *Delhi*.—The Hindoo remains of Delhi are few but interesting. The stone pillars of Asoka and the iron pillar are well known, but the other remains have not yet been described, although none have been more frequently visited than the magnificent ruined cloisters around the Kutb Minar, which belong to the period of the great Tuär dynasty.

VIII. *Kanouj*.—No account of the ruins of this once celebrated capital has yet been published. Several ruins are known to exist, but it may be presumed that many more would be brought to light by a careful survey of the site.

IX. *Kansambi*.—On the Jumna 30 miles above Allahabad. The true position of this once famous city has only lately been ascertained. It has not yet been visited, but it may be confidently expected that its remains would well repay examination.

X. *Allahabad*.—The only existing relics of antiquity that I am aware of are the well known Pillar of Asoka and the holy tree in one of the underground apartments of the Fort. Many buildings once existed, but I am afraid that they were all destroyed to furnish materials for the erection of the Fort in the reign of Akber.

XI. To the south of Allahabad there are the ruins of *Kajráha* and *Mahoba*, the two capitals of the ancient Chandel Rajas of Bundelkund. The remains at *Kajráha* are more numerous and in better preservation than those of any other ancient city that I have seen. Several long and important inscriptions still exist which give a complete genealogy of the Chandel dynasty for about 400 years.

XII. *Benares*.—The magnificent Tope of Sarnath is well known; but no description of the Tope, nor of the ruins around it, has yet been published. At a short distance from Benares is the inscribed pillar of Bhitari, which requires to be re-examined.

XIII. *Jaunpoor*.—Although the existing remains at this place are Mahomedan, yet it is well known that the principal buildings were originally Hindoo temples, of which the cloisters still remain almost

unaltered. These ruins have not yet been described, but from my own success, in the beginning of this year, in discovering a Sanskrit inscription built into one of the arches I believe that a careful examination would be rewarded with further discoveries of interest illustrative of the great Rathor dynasty of Kanouj.

XIV. *Fyzabad*.—The ruins of Ajoodhya have not been described. Numerous very ancient coins are found on the site, and several ruined mounds are known to exist there; but no account has yet been published. As the birth-place of Ráma, and as the scene of one of the early events in Buddha's life, Ajoodhya has always been held equally sacred, both by Brahmins and by Buddhists, and I feel satisfied that a systematic examination of its ruins would be rewarded by the discovery of many objects of interest.

XV. *Srāvasti*.—Even the site of this once celebrated city is unknown, but it may be looked for between Fyzabad and Goruckpoor.

XVI. *Kapilavastu*.—The birth-place of Buddha, was held in special veneration by his followers; but its site is unknown.

XVII. *Kusinagara*.—The scene of Buddha's death, was one of the most holy places in India in the estimation of Buddhists; but its site is at present unknown. It may, however, confidently be looked for along the line of the Gunduk river. At *Kapila* and *Kusinagara*, the scenes of Buddha's birth and death, numerous Topes and state-ly monasteries once existed, to attest the pious munificence of his votaries. The ruins of many of these buildings must still exist, and would no doubt reward a careful search. At *Mathiah Rádhiyah*, and *Bakra*, in Tirhoot, stone pillars still remain, and in other places ruined Topes were seen by Major Kittoe; but no description of these remains has yet been made known.

XVIII. *Vaisáli*.—This city was the scene of the second Buddhist synod, and was one of the chief places of note amongst Buddhists. At Bassar, to the north of Patna, one Tope is known to exist, but no search has yet been made for other remains. The people of Vaisáli were known to Ptolemy, who calls them Passalæ.

XIX. *Patna*, the ancient Palibothra.—I am not aware that there are any existing remains at Patna, but numerous coins, gems, and seals are annually found in the bed of the river.

XX. *Rajagriha*, between Patna and Gaya, was the capital of Magadha, in the time of Buddha. Some of the principal scenes of



his life occurred in its neighbourhood, and the place was consequently held in very great veneration by all Buddhists. Every hill and every stream had been made holy by Buddha's presence, and the whole country around Rajagriha was covered with buildings to commemorate the principal events of his life. Numerous ruined Topes, sculptured friezes, and inscribed pillars still remain scattered over the country, as lasting proofs of the high veneration in which this religious capital of Buddhism was held by the people.

6. In this rapid sketch of the places that seem worthy of examination, I have confined myself entirely to the N. W. Provinces and Behar, as containing most of the cities celebrated in the ancient history of India. But to make this account of Indian archæological remains more complete, it would be necessary to examine the ancient cities of the Punjab, such as Taxila, Sakala, and Jalandher on the west, the caves and inscribed rocks of Cuttack and Orissa on the east, and the Topes and other remains of Ujain and Bhilsa, with the caves of Dhumnar and Kholvee in Central India.

7. I believe that it would be possible to make a careful examination of all the places which I have noted during two cold seasons. The first season might be devoted to a survey of Gaya and Rajagriha, and of all the remains in Tirhoot to the eastward of Benares and Goruckpoor; while the survey of all to the westward of Benares would occupy the second season.

8. I would attach to the description of each place a general survey of the site, showing clearly the positions of all the existing remains, with a ground plan of every building or ruin of special note, accompanied by drawings and sections of all objects of interest. It would be desirable also to have photographic views of many of the remains, both of architecture and of sculpture; but to obtain these it would be necessary to have the services of a photographer. Careful fac-similes of all inscriptions would of course be made; ancient coins would also be collected on each site, and all the local traditions would be noted down and compared. The description of each place, with all its accompanying drawings and illustrations, would be complete in itself, and the whole, when finished, would furnish a detailed and accurate account of the archæological remains of Upper India.

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From LIEUT.-COL. H. YULE,

*Secy. to the Govt. of India.*

To COL. A. CUNNINGHAM, Engineers,

*Public Works Department,*

*Fort William, 31st January, 1862.*

*General.*

SIR,—With reference to what passed at your interview with His Excellency the Viceroy at Allahabad in November last, and past demi-official correspondence, His Excellency the Governor General in Council has been pleased to appoint you Archæological Surveyor to the Government of India with effect from the 1st December last.

2. Whilst so employed, you will receive a staff salary of Rs. 450 a month in addition to the pay and allowances of your rank.

3. You will also be at liberty to expend money not exceeding Rs. 250 in any one month, on account of measurements, excavations, drawing, and minor mechanical assistance, for which and for your allowances you can submit monthly contingent bills to the Controller and Examiner, Bengal.

4. The course of your investigations will be that sketched out in the Memorandum which you submitted to His Excellency the Governor-General, passing from South Behar into Tirhoot, Goruckpoor, and Fyzabad.

5. I am to request that you will be good enough to furnish this Department regularly with a brief monthly statement of the localities and general character of the objects that have occupied you during the month.

I have, &c.,

(Sd.) H. YULE, *Lieut.-Colonel,*

*Secy. to the Govt. of India.*

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From LIEUT.-COL. H. YULE,

*Secy. to the Govt of India.*

To COL. A. CUNNINGHAM,

*Archæological Surveyor to the Govt. of India.*

*Public Works Department,*

*Fort William, 21st February, 1862.*

*General.*

*Antiquities.*

SIR,—I am directed to send for your use two printed copies of

your own Memo. on the investigation of the archæological remains of Upper India, and of the Governor General's Minute on the subject. These papers have been communicated to the Asiatic Society for publication in their Journal.

2. Whilst looking up former records in connexion with archæological investigation, an endeavour was made, both in the Home Department here, and by a reference to Allahabad, to trace the reports of Major Kittoe's investigations, whilst he was employed on a duty resembling your own, between 1847 and his death. Though it appears from the records that Major Kittoe made several journeys in Behar, made many sketches, and had drawings in preparation, no trace is found of the submission of any report of his operations or their result, nor of the drawings which were prepared.

3. It is possible that you may be able to throw some light on the matter from your personal knowledge, and this the Government would be glad to receive. But the fact as it stands is extremely unsatisfactory; and it makes it necessary that the Governor-General in Council should desire you to consider it nothing less than an absolute duty to submit full particulars of your researches, and of their results, so far as they may have been arrived at, as speedily as possible after the close of each season in the field, and *certainly* before the commencement of the next.

I have, &c.,

(Sd.) H. YULE, *Lieut.-Colonel,*

*Secy. to the Govt. of India.*

2. From Mr. Blyth, a memoir on the living Asiatic species of Rhinoceros.

3. From Babu Radha Nath Sikdar, abstracts of Meteorological Observations taken at the Surveyor General's office in the month of September last.

4. From Mr. W. T. Blanford, a paper containing an account of a visit to Puppadoung, an extinct volcano in Upper Burmah.

This paper was read by Mr. Oldham, who added some remarks on the geological features described, and pointed out the interest of the discovery and of the deductions Mr. Blanford had drawn from it.

5. From Rev. K. M. Banerjea, a dissertation on the Márkan-deya Purána.

The dissertation will appear as a preface to Mr. Banerjea's



edition of the Márkandeya Purána now in course of publication in the Bibl. Indica. It was read to the meeting, and a vote of thanks was given to the author.

The Librarian submitted his report of the accessions to the Library since the Meeting in December last.

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The following books and periodicals have been added to the Library since the meeting in December last.

*Presented.*

Etudes sur L'Astronomie Indienne, Par M. Biot, (Etrait du Journal des Savants).—BY THE AUTHOR.

Traduction du Surya-Siddhanta, Par M. Biot.—BY THE SAME.

Brata-Joeda, Door A. B. Cohen Stuart, 2 Vols.—BY THE BATAVIAN ACADEMY.

Memoirs of the Geological Survey of India, (Palæontologia Indica).—BY THE SUPERINTENDENT GEOL. SURVEY OF INDIA.

Journal Bombay Royal Asiatic Society, Vol. 6, No. 21.—BY THE SOCIETY.

Annals of Indian Administration, Parts 3 and 4 of Vol. 5, for Sept. and Dec. 1861.—BY THE BENGAL GOVERNMENT.

Annual Report of the Branch of the Marine Department under control of the Government of India, for 1860-61.—BY THE SAME.

Magnetical and Meteorological Observations made at the Government Observatory, Bombay in 1860.—BY THE BOMBAY GOVERNMENT.

Vividhārtha Sangraha, Nos. 77 and 78.—BY THE EDITOR.

Die Lieder des Hafis, Vol. 3, Part 3. By Professor Hermann Brockhaus.—BY THE AUTHOR.

The Calcutta Christian Observer for December, January and February.—BY THE EDITOR.

Notes on Medical Cinchona Barks of New Granada. By H. Karsten.—BY THE MADRAS GOVERNMENT.

Diwan Nazim.—BY NAWAB MEHDEE ALI KHAN, BAHADUR.

Cours D'Hindoustani, being a Discourse by M. GARCIN DE TASSY.—BY THE AUTHOR.

Journal Asiatique, Tome XVIII., No. 70.—BY THE PARIS SOCIETY.

Journal of the American Oriental Society, Vol. 6, No. 1.—BY THE SOCIETY.

Journal of the Academy of Natural Sciences of Philadelphia, Vol. 3, Part 3.—BY THE ACADEMY.

Panoramic Views of Kashmir drawn by Capt. T. G. Montgomerie, 3 copies.—BY THE SURVEYOR GENERAL OF INDIA.

Notices of the Proceedings at the Meetings of the Members of the Royal Institution of Great Britain, Part XI. 1860-61.—BY THE INSTITUTION.

A List of Members, Officers, &c. of the Royal Institution of Great Britain, for 1860.—BY THE SAME.

The Oriental Baptist for December, January and February.—BY THE EDITOR.

The Oriental Christian Spectator for October, November and December.—BY THE EDITOR.

Proceedings of the Royal Society of London, Vol. 11, No. 46.—BY THE SOCIETY.

Report of the Committee of the Bengal Chamber of Commerce, from 1st May to 31st October, 1861.—BY THE CHAMBER.

An Introduction to Indian Meteorology, By Babu R. N. Sikdar.—BY THE AUTHOR.

Report on the Administration of the N. W. Provinces, for 1860-61.—BY THE BENGAL GOVERNMENT.

Report of the British Association for the advancement of Science, Oxford, 1860.—BY THE ASSOCIATION.

Selections from the Records of the Bombay Government, No. LXI. New Series, with 20 sheets of Sketches to illustrate Capt. Chambers' Report on Irrigation from the Taptee River, contained in them.—BY THE GOVERNMENT OF INDIA.

Selections from the Records of the Government of India, Foreign Department, No. 29, containing Progress Report of the Forests of the Tenasserim and Martaban Provinces for 1858-59 and 1859-60.—BY THE SAME.

Selections from the Records of the Madras Government, No. 71, containing Administration Report of the Madras Public Works for 1860-61.—BY THE MADRAS GOVT.

Selections from the Records of the Government of India, Military Department, No. 2, containing Report on the extent and nature of the Sanitary Establishments for European troops in the Bengal, Madras and Bombay Presidencies.—BY THE GOVERNMENT OF INDIA.

Weber's Indische Studien, Vol. VI.—BY THE AUTHOR.

Zeitschrift der Deutschen Morgenlandischen Gesellschaft, Vol. 15, Parts 3 and 4.—BY THE SOCIETY.

Annals of the Lyceum of Natural History of New York, Vol. 7, Nos. 1 to 9.—BY THE LYCEUM.

Defence of Dr. Gould by the Scientific Council of the Dudley Observatory.—BY THE TRUSTEES OF THE OBSERVATORY.

Reply to the "Statement of the Trustees" of the Dudley Observatory, by BENJ. A. GOULD, Jr.—BY THE SAME.



Smithsonian Miscellaneous Collections,—Tables, Meteorological and Physical.—BY THE S. INSTITUTION.

Meteorology in its connection with Agriculture, by Prof. J. Henry.—BY THE AUTHOR.

Journal of the Academy of Natural Sciences of Philadelphia, Vol. III. Part 3 and Vol. IV. Part 4.—BY THE ACADEMY.

Report on Insanity and Idiocy in Massachusetts. By Dr. E. Jarvis.—BY THE AUTHOR.

Memoirs of the Historical Society of Pennsylvania, Vols. 5 and 6.—BY THE SOCIETY.

First and second Report of a Geological Reconnoissance of the northern, middle and southern counties of Arkansas, for 1857, '58, '59 and '60.—BY THE GOVERNOR OF ARKANSAS.

Proceedings of the American Academy of Arts and Sciences, Vol. 3, from May 1852 to May 1857.—BY THE ACADEMY.

Ditto of the Semi-Annual Meeting of the American Oriental Society.—BY THE SOCIETY.

Proceedings of the Academy of Natural Sciences of Philadelphia, from January to December, 1856.—BY THE ACADEMY.

Report on the Geological Survey of the State of Iowa, Parts 1 and 2.—BY THE GOVERNOR OF IOWA.

Statistical Report on the sickness and mortality in the U. States, from 1855 to January 1860.—BY THE SECRETARY OF WAR, U. States.

Report of the Superintendent of the U. S. Coast Survey for 1856.—BY PROF. BACHE, Supdt. U. S. Coast Survey.

Smithsonian Contributions to Knowledge, Vols. 9, 11 and 12.—BY THE S. INSTITUTION.

Annual Report of the Board of Regents of the Smithsonian Institution, for 1856, 1857, 1858 and 1859.—BY THE SAME.

An account of the Smithsonian Institution, its founder, building, operations, &c. By W. J. Rhees.—BY THE SAME.

The Transactions of the Academy of Science of St. Louis, Vol. 1, No. 4.—BY THE SAME.

Astronomical Observations made at the Observatory of Cambridge. By the Rev. James Challis, M. A., F. R. S., &c. Vol. XIX. For the years 1852, 1853 and 1854.—BY THE SYNDICATE OF THE OBSERVATORY.

Annual Report of the Administration of the Bombay Presidency, for 1860-61.—BY THE BENGAL GOVERNMENT.

Selections from the Records of the Government of India, Public Works Department, No. 35, containing Reports on the Teak Forests in Pegu and the Tenasserim and Martaban Provinces, for 1860-61.—BY THE GOVERNMENT OF INDIA.

Andamanese Vocabulary and Phraseology, 2 copies.—BY THE SAME.

Act of Incorporation and Bye-Laws of the Academy of Natural Sciences of Philadelphia.—BY THE ACADEMY.

Catalogue of Human Crania in the Collection of the Academy of Natural Sciences of Philadelphia. By J. A. Meigs.—BY THE SAME.

Om Krodo, en sachsisk Afgud. Af C. A. Holmboe, Christiania, 1861.—BY THE AUTHOR.

Om Helleristninger. Af C. A. Holmboe.—BY THE SAME.

Om Hedenske Korsmonumenter af C. A. Holmboe.—BY THE SAME.

Beretning om Bodsføngslets virksomhed i Aaret 1860.—BY THE CHRISTIANIA UNIVERSITY.

Beretning om det kongelige selskab for Norges vel i Aaret 1860.—BY THE SAME.

Om od og eg, Metal og steen som Amulet. Af C. A. Holmboe.—BY THE AUTHOR.

Nyt Magazin for Naturvidenskaberne. 11te Binds 3die and 4de Hefte.—BY THE CHRISTIANIA UNIVERSITY.

Det Kongelige Norske Frederiks Universitets. Aarsberetning for 1859.—BY THE SAME.

Om Nordmændenes Landhusholdning i Oldtiden. Af Fr. Chr. Schübeler.—BY THE SAME.

Oversigt af Norges Echinodermer ved Dr. Michael Sars.—BY THE SAME.

Karlamagnus Saga Ok Kappa Hans. Udgivet Af C. R. Unger, Part 2.—BY THE SAME.

Forhandlinger i Videnskabs—Selskabet i Christiania, Aar 1860.—BY THE SAME.

Chronica Regvm Manniæ et Insvlarvm. The Chronicle of Man and the Sudreys edited from the Manuscript Codex in the British Museum and with Historical notes, By P. A. Munch.—BY THE SAME.

General Beretning for Aaret 1860. Ved Ole Sandberg, Direktör.—BY THE SAME.

Universitets—Program for 1861, Af C. M. Guldberg.—BY THE SAME.

Ditto ditto, Af H. Mohn.—BY THE SAME.

Aarsberetning for 1859.—BY THE SAME.

Statistiske Tabeller for Kongeriget Norge i Aaret 1859.—BY THE SAME.

Om Siphonodentalium Vitreum, Af Dr. Michael Sars.—BY THE SAME.

Meteorologische Beobachtungen. Aufgezeichnet auf Christiania's Observatorium, Erste Lieferung 1837—1841.—BY THE SAME.

Medicinal Beretning for 1858.—BY THE SAME.

Recueil de Lois, Resolutions, Circulaires, &c. concernant le Commerce et la Navigation du Royaume de Norvège, Christiania, 1861.—BY THE SAME.



Index Scholarum in Universitate Regia Fredericiana, Anno 1861, ab Augusto Mense ineunte Habendarum and a XVII. Kalendas Februarias Habendarum.—BY THE SAME.

Proceedings of the Numismatic Society for 1836-37.—BY THE REV. J. LONG.

Essai sur la Statistique Générale de la Belgique, par Ph. Vandermaelen, 2nd Edition, 1841.—BY THE SAME.

Sudhákara सुधाकर a bi-monthly periodical published at Agra from February 1853 to November 1856.—BY THE SAME.

*Exchanged.*

The Calcutta Review for September, 1861.

The Athenæum for October, November and December, 1861.

The Philosophical Magazine, Nos. 148 and 149 for November and December.

*Purchased.*

Deutsches Worterbuch, Vol. 3, Part 6.

The Literary Gazette, Nos. 173 and 175 to 181, Vol. 7, New Series.

Ueber die Zusammensetzung der nomina in den indogermanischen sprachen, Von F. Justi, Gottingen, 1861.

Compendium der Vergleichenden Grammatik der Indogermanischen Sprachen, Vol. I. Von August Schleicher.

Joannis Augusti Vullers Lexicon Persico-Latinum Etymologicum, Fasc. 6, Part 3.

Die Marchen des Siddhi-kur, Von B. Julg.

Revue des Deux Mondes for October 15th, November 1st and 15th, December 1st and 15th and January 1st.

Comptes Rendus, Tome LIII. Nos. 13 to 20.

Journal Des Savants for September, October and November last.

The American Journal of Science and Arts, Vol. XIX. No. 96.

Annales des Sciences Naturelles,—Botanique, Tome XIV. No. 5.

Revue et Magasin De Zoologie Nos. 9, 10 and 11 of 1861.

The Annals and Magazine of Natural History, including Zoology, Botany and Geology, Vol. VIII. Nos. 47 and 48.

Conchologia Iconica, By Lovell Reeve, F. L. S., F. G. S., Parts 212, 213, containing Figures and Descriptions of Cyclostoma and Trochus.

Notice Sur Mahomet, Par M. Reinaud.

Collection D'Ouvrages Orientaux—Maçoudi., texte et traduction par C. Barbier De Meynard et Pavet de Courteille, Tome Premier.

Das Leben und Die Lehre des Mohammad, von A. Sprenger. Erster Band.

Morgenlandische Bibliothek—Die Chroniken der Stadt Mekka, von F. Wustefeld, Vierter Band.

Histoire des Musulmans D’Espagne, Par R. Dozy, Vols. 3 and 4.

Haláyudha’s Abhidhánaratnamálá ; edited with a Sanskrit-English Glossary, By Th. Aufrecht.

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LALGOPAL DUTT.

5th March, 1862.

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*Three Sanskrit Inscriptions: Copies of the Originals, and Prefatory Observations.—By FITZ-EDWARD HALL, ESQUIRE, D. C. L.*

The first among the memorials now edited has already appeared in the pages of this Journal;\* but in a transcript so unfaithful, as to have concealed all its facts of highest value. Otherwise, it would not, certainly, have been left to the writer to discover the position of the ancient kingdom of Chedi; and, probably, the researches of some other investigator would have identified the insignificant village of Tewar with Tripurí, the Chedian capital.†

\* For 1839, pp. 481—495. Specimens of the errors which bestrew the old decipherment—a most careless and unconscientious performance,—will be given in foot-notes. Nor is the English translation a translation properly so-called.

† Tripurí is mentioned twice; Chedi, once. The places will be indicated.

For Tripurí, in connexion with Rájá Vákpati, alias Munja, of Ujjayiní, see the note after the next.

At Bhelsá, within the fort, I recently found a fragmentary inscription, built into the outer wall of a modern house, and looking upon one of the streets of the town. Subjoined is all that remains of a record of which perhaps a full half is missing:

\* \* \* \* \* अयमयमपि नन्वाश्रिता नाऽश्रिताऽस्य  
मेहं मे वेदवत्या नियमितजनताक्षोभमस्याऽप्यजसम् ।  
तेजोमय्यत्र चोच्चैर्विततमिति विदित्वाऽऽदरेणाऽऽत्मतुल्यं  
भाद्रहस्वामिनामा रविरवतु भुवः स्वामिनं कृष्णराजम् ॥  
चेदीशं समरे विजित्य शबरं संहृत्य सिंहाक्रयं  
रालामण्डलोदपाद्यवनिपो भूभ्यां प्रतिष्ठाप्य च ।  
देवं द्रष्टुमिहाऽगतो रचितवांस्तोत्रं पवित्रं परं  
ओमत्कृष्णवपैकमन्त्रिपदभाक् कौण्डिन्यवाचस्यतिः ॥  
सुचिरमियं कृतिरास्तां रुचिरा श्रीमद्भजाङ्गुशेयस्य ।  
काकूकेन विलिखिता कायस्यशे \* \* \* \* \*

The inscription begins with a doxology to Vishnu; to the lotus of his navel; to Brahmá, who originated therefrom; to Brahmá's son, Atri; and to the Moon, which emanated from one of Atri's eyes.

From the Moon, by a daughter of the Sun, sprung Bodhana; and from him was born Purúravas, who had to wife Urvas'í and Earth. Among the descendants of Purúravas was Bharata. To him the Haihayas traced their origin; and from these came Kártavírya, the founder of the family of Kalachuri.\* To this family belonged the last dynasty that dominated over Chedi.

For want of context, and from other causes, entire certainty as to the drift of this throughout is impossible. But that thus much is asserted, one may be pretty confident. Kaundinya, entitled Váchaspati, was premier of a Rájá Krishna, and dwelt on the Vetravatí. After discomfiting the lord of Chedi, by slaying a S'abara named Sinha,—probably the Chedian generalissimo,—he established the district of Rálá, and Rodapádi, which, also, seems to denominate a district. Manifestly in honour of these successes, he repaired to the places where the inscription was set up, and had these lines written in praise of the sun, under the epithet of Bháilla; which divine luminary is invoked to serve as King Krishna's protector. Gajánkus'oya composed the eulogy, and Kákúka copied it.

Apparently, Krishna's newly annexed districts were wrested from Chedi. But whether that kingdom reached, previously, as far towards the west, as the banks of the Vetravatí, is undetermined. As for the antiquity of the memorial, it would be unsafe to base any conclusion on its palæography. I am convinced, from inspection of inscriptions nearly contemporary, that archaism of appearance was sometimes studiously affected in these records.

There is no ground to suppose, that the inscription was brought to Bhelsá from a distance. Once displaced from its original position, it must have had—such is the Indian indifference to relics of the past—no value except for the feet and inches of the tablet on which it is engraved; and the vicinity of Bhelsá does not want for stone-quarries. The sun, as Bháilla, was, we see, once an object of worship. At first sight, the word has, certainly, a barbarous aspect;\* and yet it may possibly have been formed, anomalously, from *bhā*, "light" and the Vaidika root *il*, defined by the grammarians "to throw:" "the thrower of light." Euphony may have doubled the final consonant. To Bháilla add *ís'a*, and the combination is *Bháilles'a*. Soften this, and we easily account for Bhelsá. Bháilla, as will be seen a few pages on, at one period gave name to a tract of country comprising twelve districts.

It may now be considered as certain, that Bhelsá was not so called because of its occupation by Bheels. See this Journal, for 1847, p. 745.

Independently of the references in this paper, Bháilla, the divinity, is mentioned in an inscription somewhere in Gwalior, of which I have formerly spoken. *Vide* p. 7, *Supra*, second foot-note.

\* Or, optionally, it should seem, Kulachuri. In the sixth stanza of the following inscription is Kulachuri; but Kalachuri is implied in the thirteenth stanza. The latter form is read, unmistakably, on the Gopálpur tablet. See, further note *d*, at p. 517 of the *Journal of the American Oriental Society*, Vol. VI.

The tablet just adverted to is said to have been transported from Karanbel, a few miles distant from the spot where it now lies. I examined it on the fifth

[\* Might it be the Prákrit termination *illa* for *matup*? Vararuchi (iv. 25) gives *máláilla* for *málávat*.—EDS.]



Beginning with Yuvarāja, father of Kokalla, and ending with Ajayasinha, heir-apparent, the line of kings recorded in the inscrip-

of last January. Gopálpur is a small village on the Nerbudda, about ten miles from Jubulpore. Some twenty or thirty years ago, as I was informed, in an attempt made to remove the tablet, it was broken.

The space occupied by writing,—twenty lines and two-fifths,—measures about a yard and a half by two feet. The inscription is entirely in verse, and it has no date. Its left-hand portion, the smaller, contains few words any longer decipherable; and the right-hand portion is legible only here and there. Still, the fragments which I here annex leave no doubt as to its origin.

- Line VI. आसोत्तस्य सहस्रपाणिकिरणैर्वशः सहस्रार्जुनः ।  
 „ VII. \* \* \* \* \* कलचुरिकुलसम्भसहसः ।  
 „ IX. कर्णदेवः ।  
 „ XI. ओयशः कर्णदेवोऽस्य पृथ्वीपतिरभूत् सुतः ।  
 „ XV. रराज राजव्रजधर्मराजम्  
 तस्याऽनुजः श्रीजयसिंहदेवः ।  
 „ XVI. श्रीमद्गोसलदेवी ।  
 जयति तद् \* \* क्षाधरः श्रीविजयसिंहदेवद्वयः ।  
 यदसिः शत्रुषु कालः सूते शुभं यशश्चिवम् ॥  
 श्रीसोमराजकृतं राजावलीवर्णनमिति ।  
 „ XVII. तस्मादखर्वगुणपर्वतगर्वितोऽन्तः  
 श्रीमल्लहणः ।  
 „ XVIII. जागलेति प्रियाऽनूढा तस्याऽसीच् चारुदर्शना ।  
 हृदयानन्दजननी सम्पतिरिव निचला ॥  
 „ XIX. \* \* \* \* \* गणः किल निजः सम्प्रेषितो यः क्षितिम् ।  
 तामुत्कर्षयितुं कृतो हरिगणस्तस्मात् स जज्ञे ध्रुवम् ॥  
 „ XX. सहादेवीति नाम्नाऽऽसीद् धर्मपत्नी पतिव्रता ।  
 सुचरिताऽपराऽप्यस्य \* \* \* सहधर्मिणी ॥

Here we have the names of Arjuna the thousand-armed, of Kalachuri, Karna, Yas'ahkarna, Jayasinha, Gosala, and Vijayasinha; and these names indicate, that the inscription is Chedian, and of nearly the same time with that of the inscription printed at large in the coming pages. Whose concubine madam Jogalā was, does not appear. Nor is it known who Harigana and Malhana were. Equally in the dark are we as to the bigamous husband of Mahādevī and of another lady whose name has been obliterated. Finally, a part, at least, of this memorial was composed by one Somarāja.

Malhana, I think, is a name that occurs in the Rājataranginī. But I write in the wilderness, with few books about me. For Malhana of Kanauj, see Dr. Anfrecht's account of the *Vis'wa-prakāś'a* in *Cat. Cod. Manuscript. Sanscrit. &c.*, p. 187.

Last Christmas I was encamped at Bilahari,—in the Jubulpore district,—which place the common fame of the neighbourhood connects with Rājā Karna. It must once have been a town of some importance. I found there one complete inscription, in the character of twelve or fifteen hundred years ago, but well nigh completely obliterated by time and weather; and two fragments of a second

tion is so well-known, that their names need not be repeated.\* Of their family we are here furnished with a few facts additional to those which I have detailed on former occasions.† Gángeya died at Prayága, or Allahabad;‡ and we are led to infer, that his wives, amounting, in round numbers, to a hundred, underwent cremation with the mortal remains of their lord.§ Karna built the city of Karnávatí.|| The consort of Gayákarna, or Gayakarna, was Alhana;

inscription, less ancient, and yet, what from discontinuity and effacement, no longer intelligible. It mentions a Rájá Indra.

\* An inedited inscription, much mutilated, which I have very lately examined at Udayapura, in Gwalior, sets forth, that Vákpati,—whom I know to have been the same with Munja,—defeated Yuvarájá, and took possession of Tripurá. Vákpati lived in the tenth century; and a synchronism of some value is thus established. I must, however, choose a time of leisure to enlarge upon its consequences.

But the inscription adverted to settles one point to which I cannot here forego reference. The father of Bhoja of Dhárá was Sindhu, not Sinha; and he is called younger brother of Vákpati, not elder brother. Vákpati had issue in Vairisinha; and Vairisinha had a son, Harsha. It seems probable, that the accession of Bhoja to the throne was owing to their having pre-deceased him.

At p. 205 of last year's Journal, building on what now turn out to be imperfect and erroneous data regarding the rulers of Málava, where I have spoken of Vákpati as being cousin-german to Bhoja, I ought to have written "first cousin once removed." But my new inscription shows, as has been seen, that he was Bhoja's paternal uncle. Nor was Vákpati's kingdom distinct from that afterwards subject to his nephew. Nor, again, is it now to be surmised, by way of consequence, that Bhoja's sway extended over less than the whole of Málava.

I return to the king Kṛishṇa spoken of two notes back. And who was he? Bhoja's grandfather's grandfather, Kṛishṇa, or Upendra, long preceded the presumed founder of the last Chedian dynasty, Yuvarája, who is reported to have been routed by Bhoja's uncle, Vákpati. It seems more likely, that we have here to do with the master of a kingdom intermediate to Chedi and Málava, and which was eventually absorbed by the latter.

Kokalla, of Chedi, son of the Yuvarájá just mentioned, is said to have defeated a Rájá Kṛishṇa in the south. A short time ago I expressed the opinion, that this Kṛishṇa "was, not impossibly," that ancestor of Bhoja with whom, as my fresh facts admonish, it is impossible to identify him. Future investigation may establish, that he was one with the Kṛishṇa of the Bhelsá inscription.

Of Kokalla I further wrote: "Again, the Bhoja whom he is recorded to have vanquished in the west, was, without much question, one of the two kings of Kanauj who bore that appellation." As Vákpati was of the same age with Yuvarája, we may conclude, that it was Bhoja of Málava, Vákpati's nephew, against whom Kokalla, son of Yuvarája, claims to have been successful. See last year's Journal, p.

† See the *Journal of the American Oriental Society*, Vol. VI., pp. 499—537; and this Journal for 1861, p. 318.

‡ Col. Wilford,—*Asiatic Researches*, Vol. IX., p. 108,—claiming the authority of a copper-plate grant for what he states, alleges, that Gángeya had the title of Vijayakantaka, and that "he died in a loathsome dungeon." This seems doubtful. Facts of such a nature would scarcely be spoken of, by an Indian panegyrist, of any one related to the magnate he is engaged in belauding.

§ See the eleventh stanza of the following inscription.

|| In a literal translation, the twelfth stanza is as follows: "By whom, *Karna*, was established, on earth, a realm of Brahma, known as Karnávatí; the foremost



and that of Vijayasinha was Gosala. The appellations of these two ladies have hitherto been misrepresented.\*

A crown-village, Choraláyí, in the *pattalá* of Sambalá, is transferred by the relíque under notice, a legal document. The donor is Gosala, on the part of her son, Ajayasinha, a minor. The donee is a learned Bráhmaṇ, one Sídha, son of Chhiktú, son of Súlhaṇa, son of Janárdana.† Six royal functionaries are enumerated in the grant; and the official designations are added of three more whose names are not specified.‡

abode of happiness, a root to the creeper of Vaidika science, a frontlet to the celestial river, a stay of Bráhmans."

The epithet of "celestial river" is usually appropriated to the Ganges. It is given, above, to the Narmadá.

I once suggested, that Karnávatí might have been misread for Karnávalí, and that the latter word might have been corrupted into Karanbel, the vernacular name of some ruins, marking the site of a once extensive city, adjoining Tewar, or Tripurí. Those ruins I have carefully explored. There is nothing to be said of them, further than that they now serve as an inexhaustible stone-quarry, and supply countless torsos of the most obscene sculpture that depravity could easily conceive.

As for the word Karanbel, its first two syllables may well be a corruption of Karṇa. The ending *bel* is not unknown to India, in designations of places: witness Bábúbel and Chaubebel, in the district of Ghazeepore. Sir H. M. Elliot thinks, that "it may possibly be connected with the Mongol *balu*, 'a city,' as in Khán-balú, the city of the Khán." *Appendix to the Arabs in Sind*, p. 214, foot-note.

Karnávalí would have softened into Karnautí, or, more likely, into Karnaulí; Karnávatí into Karnautí.

\* In the forms Arhaṇa and Gásala.

† It is set forth, that he was of the *gotra* of Sávarṇi, and that to this *gotra* appertain the Bhárgana, Chyávana, Apnavána, Aurva, and Jámadagnya *pravaras*. There is a singular mistake here; for the *pravaras* of the Sávarṇyas are the Bhárgava, Vaitahavya, and Sávetasa.

A *gotra* is a family sprung from one of a certain number of Rishis, and from him denominated. *Pravaras* appear to be names of the families of certain persons from whom the founders of *gotras* were descended, and of the families of the founders themselves.

We read in the *Ā's'waláyana-kalpa-sútra*: यजमानस्याऽऽर्षेयान् प्रष्टुणीते यावन्तः स्युः परं परं प्रथमम्। Náráyana Gárgya, Ās'waláyana's commentator, says: आर्षेयः प्रवर इति पर्यायौ आभ्यां ऋषिवंशनामधेयभूता आर्ष्टिषेणादयः शब्दा उच्यन्ते। Baudháyana asserts, in his *Kalpa-sútra*: विश्वामित्रो जमदग्निर्भरद्वाजोऽथ गौतमः अत्रिर्वसिष्ठः कश्यप इत्येते सप्तर्षयोऽगस्त्याष्टमानां यदपत्यं तद गोत्रमित्युच्यते।

The explanation of *pravara*, on which Professor Max Müller's view of the expression is based, seems too artificial to demand acceptance, unless it turns out to be strongly corroborated by other Bráhmaṇical authority. See *A History of Ancient Sanskrit Literature*, &c., first edition, p. 386.

‡ Sáiváchárya Bhaṭṭáraka was mahá-mantrin, Vidyá-deva, rája-guru; Yajna-dhara, mahá-purohita; Kíkí Thakkura, dharma-pradhána; Vatsarája,—a pluralist, happy, or unhappy,—mahákshapatalika, mahá-pradhána, artha-lekhin, and das'a-múlíka; and Purushottama, mahá-sándhi-vigrahika.

The present inscription is, by one year, the latest, as yet brought to light, published by the Haihaya rulers in Central India. We learn, from it, that the capital of those potentates, from the very first, was Tripurí; and that their kingdom, so long as they are known to have possessed it, was called Chedi. We find it set forth, that, "In that *Kalachuri* family was a monarch, eminent among the just, His Majesty Yuvarája,—a young lion in destroying odour-bearing elephants, *i. e.*, pride-blind kings,—who sanctified Tripurí, resembling the city of Purandara."\*

As I have elsewhere made out, the era to which the date of the inscription is to be referred is a point still awaiting solution.†

#### INSCRIPTION I.

ॐ नमो ब्रह्मणे ।

जयति जलजनाभस्तस्य नाभीसरोजं  
जयति जयति तस्माज् जातवानजस्तुतिः ॥  
अथ जयति स तस्याऽपत्यमत्रिस्तदक्षसु  
तदनु जयति जन्मप्राप्तवानब्धिवन्धुः ॥ १ ॥  
अथ बोधनमादिराजपुत्रं गृहजामातरमज्जबान्धवस्य ।  
तनयं जनयाम्बभूव राजा गगनाभोगतडागराजहंसः ॥ २ ॥  
पुत्रं पुरुवरसमौरसमाप स्रुनुर्  
देवस्य सप्तजलराशिरसायनस्य ।  
आसीदनन्यसमभाग्यशतोपभोग्या  
यस्योर्वशीव सुकलत्रमिहोर्वरा च ॥ ३ ॥  
अत्राऽन्वये किल शताधिकसप्तिमेध-  
यूपोपरुद्धयमुनोक्तविविक्तकीर्तिः ।  
सप्ताब्धिरत्नरसनाभरणाभिराम-  
विश्वम्भराशुभरतो भरतो बभूव ॥ ४ ॥  
हेलागृहीतपुनरुक्तसमस्तशस्त्रो  
गोत्रे जयत्यधिकमस्य स कार्तवीर्यः ।

Then come, unnamed, the *mahá pratíhára*, the *dushta-sádhyā-charādhyaksha*, the *bhāṇḍágárika*, the *pravátva-vára*, and the *as'wa-sáadhanaka*.

Of the duties of several of these officers nothing is known with certainty. The title before the last, with, perhaps, the last itself, is, probably, represented amiss. The *das'a-múlika* is called, near the end of the inscription *das'a-múlin*.

\* So runs the seventh couplet. See the note on it, and two notes further on.

† See the *Journal of the American Oriental Society*, Vol. VI., p. 501.



अत्रैव हैहयन्टपान्वयपूर्वपुंसि  
 राजेतिनाम शुश्रूक्ष्मणि चक्रमे यः\* ॥ ५ ॥  
 स हिमाचल इव कुलचुरिवंशमसूत क्षमाभृतां भर्ता ।  
 मुक्तामणिभिरिवाऽमलवृत्तैः पूतं महोपतिभिः ॥ ६ ॥  
 तत्राऽन्वये नयवतां प्रवरो नरेन्द्रः  
 पौरन्दरीमिव पुरीं त्रिपुरीं † पुनानः ।  
 आसीन् मदान्यन्टपगन्धगजाधिराज-  
 निर्माथकेसरियुवा युवराजदेवः ॥ ७ ॥  
 सिंहासने नृपतिसिंहममूष्य सूनुम्  
 आरुरूपवनिभर्तुरमात्यमुष्याः ।  
 कोकल्लमर्णवचतुष्टयवीचिसङ्घ-  
 सङ्घट्टरुडचतुरङ्गचभूपवारम् ॥ ८ ॥  
 इन्दुप्रभां निन्दति हारगुच्छं जुगुप्सते चन्दनमाक्षिपन्ती ।  
 यत्र प्रभौ दूरतरं प्रयाते वियोगिनीव प्रतिभाति कीर्तिः ॥ ९ ॥  
 मरकतमणिपट्टप्रौढवक्षाः स्मितास्यो  
 नगरपरिघदैर्घ्यं लङ्घयन् दोर्दयेन ।  
 शिरसि कुलिशपातो वैरिणां ‡ वीरलक्ष्मी-  
 पतिरभवदपत्यं यस्य माङ्गिरदेवः ॥ १० ॥  
 प्राप्ते प्रयागवटमूलनिवेशवन्धौ  
 सार्धं शतेन गृहिणीभिरमुत्र मुक्तिम् ।  
 पुत्रोऽस्य खड्गदलितारिकरीन्द्रकुम्भ-  
 मुक्ताफलैः स§ ककुभोऽर्चति कर्णदेवः ॥ ११ ॥  
 अग्र्यं धाम श्रेयसो वेदविद्या-  
 वल्लोकन्दः स्वःस्ववन्ताः किरीटम् ।  
 ब्रह्मस्तम्बो येन कर्णावतीति  
 प्रत्युष्टायि क्षातलब्रह्मलोकः ॥ १२ ॥  
 अजनि कलचुरीणां स्वामिना तेन ह्मणा-॥  
 न्वयजलनिधिलक्ष्म्यां श्रीमदावल्लदेव्याम् ।

\* In the old decipherment, चाऽ करोत् सः.

† Formerly misread स्वपुरीं, "his own city." In the next line, there was also an error: गर्व, for गन्ध.

‡ Not, according to the old reading, वैरिणो.

§ In place of the स्म of my predecessor.

|| It has not been proved, that the Hindus of old times applied the term

शशभृदुदयशङ्काक्षुब्धदुग्धाब्धिवीची-  
 सहचरितयशःश्रीः श्रीयशःकर्णदेवः ॥ १३ ॥  
 अत्युत्तुङ्गगिरीन्द्रकन्दरसरस्तीरं कथञ्चिद् गतैर्  
 ईषन्निर्वृतिमद्भिरागतमिति चक्षैर्वदद्भिर्मिथः ।  
 आकर्ण्य प्रतिशब्दमम्बुनि निजं बिम्बं मिलद्वैरिवत्  
 संवीक्ष्य क्षणमासितं किमपरं यस्याऽरिभिस्तत् तथा ॥ १४ ॥  
 तस्याऽऽत्मजोऽभूदतुलप्रतापः  
 श्रीमद्भयाकर्ण इति प्रतीतः ।  
 यस्याऽऽहवेषूद्धतवैरिकगण्ड-  
 क्केदासपूर्णव धराऽनुरक्ता ॥ १५ ॥  
 तितांसुना दिक्षु यशोवितानम्  
 उन्नम्रवंशेन गुणान्वितेन ।  
 येनाऽरिकान्ताहृदयेषु गाढम्  
 आरोपितः सञ्जनि शोकशङ्कः ॥ १६ ॥  
 असावल्लणदेव्यां श्रीनरसिंहनरेश्वरम् ।  
 सवदनमिवेच्छायां प्रयत्नं सुषुवे सुतम् ॥ १७ ॥  
 उच्चैर्हिरेण्यकशिपुप्रतिपादनेन  
 प्रीतिं परां विबुधसंहतिषु प्रकुर्वत् ।  
 सौन्दर्यभारविनिवारितमारगर्वशू-  
 चित्रं तथाऽप्ययमहो नरसिंहदेवः ॥ १८ ॥  
 यो ब्रह्मणां पाणिषु पञ्चषाणि  
 दानानि धत्ते पयसः पृषन्ति ।  
 तैरेव त्वय्यामवधूय ते च  
 रत्नाकरेऽपि प्रथयन्त्यवज्ञाम् ॥ १९ ॥  
 महीभर्ता महादानैस्तैस्तुलापुरुषादिभिः ।

Hūna to any but a division of the tribe of Kshatriyas. Venkaṭa Adhwarin, in a curious and fanciful work, doubtless indicates thereby the early Portuguese, settled in the vicinity of Madras. He has the fairness to commend the Hūnas for their justice, and ingenuity in handicrafts. This acknowledgement is, however, set off against the accusation of cruelty, impurity, and cheap esteem for Brāhmans. "Greater reprobates would be harder to find in the world;" and "Their faults baffle description," दुर्लभाः खलु ह्येभ्यः कुत्सिततमा लोके; and तेषां दोषाः पारे वाचाम् Vis'wagunādars'a, Bombay edition of S'aka 1774, fol. 22, verso.

In the present day, the pandits universally take Hūna to denote Europeans,



गि\* \* \* \* करत्यर्थं\* कृतार्थयति योऽर्थिनः ॥ २० ॥

कुर्वन् महीं ब्राह्मणसादरिच्छत्रनिबर्हणः ।

सार्धं परशुरामेण यः स्पर्धामधिरोहति ॥ २१ ॥

तस्याऽनुजो नरपतिर्जयसिंहदेवः

स्थैर्याज्ज्वलैरपि नृपैः क्रियमाणसेवः ।

यदानलुप्तयशसेव सुरद्रुमेण

व्यद्रावि भूतलतले बलिना प्रलीनम् ॥ २२ ॥

तद्यं† गुर्जरभूभुजा तु कुबलं मुक्तं तुरुष्केण च

त्यक्तः कुन्तलनायकेन सहसा कन्दर्पकेलिक्रमः ।

श्रुत्वा श्रीजयसिंहदेवनृपते राज्याभिषेकं नृपाः

सन्तासादपरेऽप्यपास्य जगतीं पारे ययुर्वारिधेः ॥ २३ ॥

कथञ्चिद् यद्यशश्चन्द्रचन्द्रिकाधबलीकृते ।

बलच्छा लक्षते‡ योऽस्मि पततो खगसंहतिः ॥ २४ ॥

रमणगुणनिकेतः केतनं मङ्गलानां

प्रचुरतरयशोभिः शोभितस्तत्तनूजः ।

नृपतिरवनिभानुर्विश्वविश्रान्तभानुर्

जयति विजयसिंहः संहतारातिसिंहः ॥ २५ ॥

दृष्टिर्यस्याः सुधाष्टयिः सन्निधिश्चाऽपि सन्निधिः ।

वाणी चिन्तामणिः श्रीमज् जीयाद् गोसलदेव्यसौ ॥ २६ ॥

स च परमभट्टारकमहाराजाधिराजपरमेश्वरश्रीवामदेवपादा-  
नुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वरपरममाहेश्वरत्रिक-  
लिङ्गाधिपतिनिजभुजोपार्जिताश्वपतिगजपतिनरपतिराजत्रयाधिप-  
तिश्रीमद्विजयसिंहदेवपतेर्विजयिनः महाराज्ञीश्रीमहाकुमारश्रीअ-  
जयसिंहदेवमहामन्त्रिशैवाचार्यभट्टारकश्रीमद्राजगुरुविद्यादेवमहा-  
पुरोहितपण्डितश्रीयज्ञधरधर्मप्रधानमहामात्यठकुरश्रीकीकीमहाक्ष-  
पटलिकमहाप्रधानार्थलेखिठकुरश्रीदशमूलिकवत्सराजमहासान्निवि-  
ग्रहिकठकुरश्रीपुरुषोत्तममहाप्रतीहारदुष्टसाध्यचराध्यक्षभाण्डागा-

\* The मतिमाने-, formerly given as the first four syllables of this group, begins with alteration, and continues and ends with invention.

† Not राष्ट्रं, as formerly read. Nor, as was stated, is the गु of गुर्जर "obscure in the original."

‡ In place of लक्ष्यते, the old reading. Of the word following the first syllable is all but erased.

रिकप्रवात्प्रवारअश्वसाधानक\* इत्येतानन्यांश्च प्रदास्यमानग्रामनिवा-  
सिजनपदांश्चाऽऽह्वय यथाहं मानयति बोधयति समाज्ञापयति च ।

यथा विदितमस्तु भवतां संवत् ६३२ श्रीमत्त्रिपुर्यां† युगादौ नर्म-  
दायां विधिवत् स्नात्वा श्रीमन्महादेवं समभ्यर्च्य मातापित्रोरात्मनश्च  
पुण्ययशोभिवृद्धये सम्बलापत्तलायां चोरलायीग्रामश्चतुःसीमापर्यन्त-  
श्चतुराघाटविशुद्धः सगोप्रचारः सजलस्थलः साम्रमधूकः सलवणाकरः  
सगर्त्तोषरः सनिर्गमप्रवेशः सजाङ्गलानूपो वृक्षारामोद्भिदोद्यानदृष्टा-  
दिसहितः‡ \* \* \* \* \* प्रवणिचरो रसवतीकामतवाडदण्डमा-  
र्गणकविशेणिमादायपट्टकिलादायदुष्टसाध्यादाय अर्धपुरुषारिका-  
दायादिसमन्वितः सवनपर्वतः सघट्टादायसर्वबाधाविवर्जितः ग्रामो-  
ऽयं सावर्ण्यगोत्राय §भार्गवच्यावनआप्रवानऔर्वजामदग्न्येतिपञ्चप्रव-  
राय कन्दोगशाखिने पण्डितश्रीजनार्दनप्रपौत्राय पण्डितश्रीसूक्तपौ-  
त्राय पण्डितश्रीकृत्तूपुत्राय पण्डितश्रीसीतशर्मणे ब्रह्मणायोदकपूर्व-  
कत्वेन शासनीकृत्याऽस्मदभ्यनुज्ञया मातृश्रीमद्दोसलदेव्या प्रदत्तः ॥

अत्र चाऽभ्यर्थना दातुर्भवति यथा ।

सर्वानेतान् भाविनः पार्थिवेन्द्रान्

भूयो भूयो याचते रामभद्रः ।

सामान्योऽयं धर्मसेतुर्दृष्ट्याणां

काले काले पालनीयो भवद्भिः ॥ २७ ॥

बज्रभिर्वसुधा भुक्ता राजभिः सगरादिभिः ।

यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम् ॥ २८ ॥

सुवर्णमेकं गामेकां भूमेरप्येकमङ्गुलम् ।

हरन् नरकमाप्नोति यावदाभूतसम्भवम् ॥ २९ ॥

तडागानां सहस्रेण अश्वमेधशतेन च ।

गवां कोटिप्रदानेन भूमिहर्ता न शुध्यति ॥ ३० ॥

\* Formerly altered to and printed °प्रमत्तवारणाश्वसाधीनका.

† So, as I conjectured when I had not yet set eyes on the copper-plate of this grant, we should read, instead of the printed श्रीमन्निपुर्यां. Here is the second mention of Tripurī in this memorial.

‡ The next six syllables are quite effaced. From this point to अर्ध० there is a blank in the old decipherment. My own reading yields little meaning; but the words are, evidently, unfamiliar technicalities. The receipts styled *dushta-sādhyādāya* must have had to do with the *dushta-sādhyā-charādhyaksha*, who has already been spoken of.

§ च्यवन I have changed to च्यावन.



स्वदत्तां परदत्तां वा यो हरेत् वसुन्धराम् ।  
 स विष्ठायां कृमिर्भूत्वा पितृभिः सह मज्जति ॥ ३१ ॥  
 फालक्यष्टां महीं दद्यात् सबीजां सस्यशालिनीम् ।  
 यावत् सूर्यकृतलोकस्तावत् स्वर्गं महीयते ॥ ३२ ॥  
 षष्टिवर्षसहस्राणि स्वर्गं वसति भूमिदः ।  
 आर्च्छेत्ता चाऽनुमन्ता च तान्येव नरके वसेत् ॥ ३३ ॥  
 वारिहीनेष्वरण्येषु शुष्ककोटरवासिनः ।  
 कृष्णसर्पास्तु जायन्ते देवब्रह्मखहारिणः\* ॥ ३४ ॥  
 अन्यायेन हृता भमिरन्यायेन तु हारिता ।  
 हरतो हारयतश्च दहत्यासप्तमं कुलम् ॥ ३५ ॥  
 अस्मत्कुलक्रमगताः समुदाहरन्ति  
 अन्यैश्च दानमिदमभ्युपमोदनीयम् ।  
 लक्ष्मीञ्चला सलिलबुद्बुदवन् नराणां  
 दानं फलं परमतः परिपालनीयम्† ॥ ३६ ॥  
 प्रजाहितार्थं स्थितयः प्रणीता  
 धर्मेषु विद्वान् परिपालयेत् ।  
 यो लोभमोहाद्भरते दुरात्मा  
 सोऽधो व्रजेद् दुर्गतिमाशु कष्टाम् ॥ ‡ ३७ ॥  
 यानीह दत्तानि पुरा नरेन्द्रैर्  
 दानानि धर्मार्थयशस्कराणि ।  
 निर्माल्यवान्तप्रतिमानि तानि  
 को नाम साधुः पुनराददीत ॥ ३८ ॥

\* “Black serpents, abiding in arid hollows of trees, in unwatered wildernesses, do they become who usurp the property of the gods, or of Bráhmans.”

It need scarcely be remarked, that Hindu land-grants are almost always followed by a number of stanzas pointed at the iniquity of wrongful resumption and such other high-handed proceedings.

At different times, and chiefly in this Journal, I have translated most of the verses appended to our inscription. I therefore confine myself, mostly, to rendering such of them as I have not before had occasion to put, at least from the readings here exhibited, into English.

† “They who have come down in our family declare, that this gift ought to be approved by others. Uncertain as a bubble of water is the fortune of men. Donation alone is *its* fruit. Hence *this donation* should be maintained.”

The prosody of these verses is somewhat free.

‡ “The wise should keep up the laws connected with virtue, established for the good of the people. The reprobate who, from avarice, or delusion, shall usurp, will promptly incur a painful hell down below.”

परिपालयेत् is very dubious grammar.

भूमिं यः प्रतिगृह्णाति यश्च भूमिं प्रयच्छति ।  
 उभौ तौ पुण्यकर्माणौ नियतं स्वर्गगामिनौ ॥ ३९ ॥  
 शुद्धो भद्रासनं क्वचं वराश्वा वरवारणाः ।  
 भूमिदानस्य चिह्नानि फलमेतत् पुरन्दर ॥ ४० ॥  
 अस्मिन् वंशेऽन्यवंशे च यः कश्चिन् नृपतिर्भवेत् ।  
 तस्याऽहं हस्तलग्नाऽस्मि शासनं न व्यतिक्रमेत्\* ॥ ४१ ॥  
 वाताम्बविभ्रममिदं वसुधाधिपत्यम्  
 आपातमात्रमधुरो विषयोपभोगः ।  
 प्राणास्तृणाग्रजलबिन्दुसमा नराणां  
 धर्मः सखा परमहो परलोकयाने ॥ ४२ ॥  
 मदंशजाः परमहोपतिवंशजा वा  
 पापादपेतमनसो भुवि भाविभूपाः ।  
 ये पालयन्त्यमरविप्रभवः स्वराज्ये  
 तेषां मया विरचितोऽञ्जलिरेष मूर्ध्नि† ॥ ४३ ॥

अभ्यधरस्य पौत्रेण श्रीधर्मस्य सूनुना लिखितं वत्सराजेन चेदोऽष्टदश-  
 मूलिना । ‡ पण्डितश्रीकेशवल्लिखितम् ॥

\* “Whatever king may be born in this *my* race, or in another race, I clasp his hands ; *praying* that he will not violate *this* patent.”

† “To those future kings, on earth,—whether born of my stock, or born of the stocks of other rulers,—who, with minds free from sin, protect, in their realms the lands of the gods and of Bráhmans, I clasp my hands above my head.”

In the second quarter of this couplet, the plate has पाषादनतमनसो. The old decipherment, hazarding a correction, gives : पाषादण्डमनसो.

The metres of the foregoing stanzas are as follows :

| No. of stanza.                                         | Name of metre.     |
|--------------------------------------------------------|--------------------|
| 1, 10, 13, 25.                                         | Máliní.            |
| 2.                                                     | Aupachhandasika.   |
| 3, 4, 5, 7, 8, 11, }<br>18, 22, 36, 42, 43. }          | Vasantatilaká.     |
| 6.                                                     | A'ryá.             |
| 9.                                                     | Smṛiti.            |
| 12, 27.                                                | S'áliní.           |
| 14, 23.                                                | S'árdulavikrídita. |
| 15, 19, 38.                                            | Indravajrá.        |
| 16, 37.                                                | S'ubhá.            |
| 17, 20, 21, 24, 26, 28, }<br>29, 30, 31, 32, 33, 34, } | Vaktra.            |
| 35, 39, 40, 41.                                        |                    |

‡ That is to say, the instrument was issued by the lord of Chedi's *das'a-múlin*, Vatsarája, son of Dharma, and grandson of Abhyadhara. In the original is चेदिश, which I have not scrupled to alter. No doubt the original was metrical, when it was placed in the hands of the engraver. A change of the third syllable of it to a double consonant, and the insertion of च before सूनुना,



सूत्रधारनामलेनोत्कीर्णम् । \*

शुभं भवतु ।

The next inscription, hitherto unpublished, is, like the first, engraved on copper. It has been transcribed from the original plates, which belong to the Asiatic Society of Bengal. The stanzas, nine in number, introducing the grant proper, have already appeared in print, and need not be repeated.† Nor are the verses that follow the prose of sufficient interest, on the score of novelty, to deserve copying.‡

### INSCRIPTION II.

\* \* \* \* \*

सोऽयं समस्तराजचक्रसंसेवितचरणः परमभट्टारकमहाराजाधि-  
राजपरमेश्वरपरममाहेश्वरनिजभूजोपार्जितश्रीकन्यकुब्जाधिपत्यश्रीच-  
न्द्रदेवपादानुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वरपरममाहेश्वर-  
श्रीमदनपालदेवपादानुध्यातपरमभट्टारकमहाराजाधिराजपरमेश्वर-  
परममाहेश्वराश्वपतिगजपतिनरपतिराजत्रयाधिपतिविविधविद्या  
विचारवाचस्पतिश्रीमद्भोविन्दचन्द्रदेवो विजयी अन्तरालपत्तलायां  
करण्डग्रामकरण्डतल्ल अनयोर्महत्तमकैवर्तप्रभृतिप्रजालोकान् तथा  
निवासिनो निखिलजनपदानपि च राजराज्ञीयुवराजमन्त्रिपुरोहित-

would give a *Vaktra* stanza. The old decipherment has; अभ्युद्धरणव्रण-  
श्रीधर्मसूनुना लिखितं वत्सराजेन वैदेशदशमूलिना.

\* Not लेखितं as was formerly misread. But the plate wants the final consonant. And the name of the engraver is Lena, not Lema.

Confusion of sibilants has, in several instances, unspecified, been redressed in the transcript now printed.

On the seal attached to the two plates are the words श्रीमद्विजयसिंहदेवः. Above is a figure of Lakshmi, supported on each side by an elephant sprinkling her with water from its proboscis. Underneath is Nandī.

† See this Journal, for 1858, pp. 242, 243.

‡ Any one familiar with the poetical excrescences of Hindu land grants will recognize them by their opening words: भूमिं यः। शङ्खं। सर्वानेतान्। वज्रभिर्वसुधा। गामेकां। तडागानां। वारिहीनेष्वरणेषु। वाताश्रविभ्रममिदं। खदत्तां। All but the last three of these stanzas will be seen at the page of this Journal following the last just referred to.

Thus ends the inscription, much more abruptly than is commonly the case with such writings.

On the seal, the ring of which holds together the two plates, are the words श्रीमद्भोविन्दचन्द्रदेव.

Above them is an effigy of Garuḍa, with folded hands: beneath is a conch-shell.

प्रतीहारसेनापतिभाण्डागारिकाक्षपटलिकभिषकनैमित्तिकान्तःपुरि-  
कदूतकरितुरगपत्तनाकरस्थानगोकुलाधिकारिपुरुषानाज्ञापयति बे-  
धयत्यादिशति च ।

यथा विदितमस्तु भवतां यथोपरिलिखितग्रामतल्लौ सजलस्थलौ  
सलोहलवणाकरौ समर्तोषरौ समधूकाम्रवनवाटिकाविटपटणयति-  
गोचरपर्यन्तौ सोर्ध्वाधश्चतुराघाटविशुद्धौ खसीमापर्यन्तौ स्वात्मा वि-  
धिवन् मन्त्रदेवमुनिमनुजभूतपितृगणां स्तुतयित्वा तिमिरपटलपाटन-  
पदुमहसमुष्णरोचिवमुपस्थायैषधिपतिशकलशेखरं समभ्यर्च्य त्रिभु-  
वनत्रातुर्वासुदेवस्य पूजां विधाय मातापित्रोरात्मनश्च पुण्ययशोभि-  
वृद्धये गोकर्णकुशलतापूतकरतलोदकपूर्वं राजश्रीयशःकर्णदेवेन रा-  
जगुरुशैवाचार्यभट्टारक श्रीरुद्रशिवप्रस्थोभिन्नात्वेन शासनीकृत्य प्रद-  
त्तौ तैश्च संवत् ११७७ कार्तिकशुक्लचतुर्दश्यां अस्मान् ससभ्यान् सा-  
क्षिणः कृत्वा ठक्कुरश्रीवसिष्ठशर्मभ्य उदकपूर्वकं शासनीकृत्य प्रदत्तौ  
अस्मत्समक्षं ताम्रपत्रकं चाऽर्पितम् \* अतपरिचेतदीयसन्तत्या च आच-  
न्द्रार्कं यावत् भोक्तव्यौ सत्वा यथादीयमानभागभोगप्रवणिकरप्रभृति-  
सर्वादायान् आज्ञाविधेयीभूय दास्यथेति ।

\* \* \* \* \*

We are here told, that, in A. V. 1177, corresponding to A. D. 1120, a transfer of landed interest was made in presence of King Govinda Chandra, of Kanauj, and his court. The property that exchanged hands, the village of Karaṇḍa and the *talla†* of Karaṇḍa, in the *pattalā* of Antarāla, passed from the possession of Bhaṭṭāraka Rudras'iva, a royal chaplain, into that of the Ṭhakkura Vasishṭha.

Rudras'iva, it is stated, was invested with his estate by Rājā Yas'ah-karṇa.‡ It can scarcely be questioned, that this was the ruler of Chedi. And how could the king of Kanauj have had authority, save as the result of conquest, over soil which was once under his control?

\* Here is a blunder of the first magnitude. Other mistakes, not quite so glaring, have been left as they were found; while a few, of a trifling character, have been silently amended.

† This term is a stranger to all the dictionaries.

‡ Yas'ahkarṇa was son of Karṇa, whose grandfather Kokalla fought with Bhoja during the first half of the tenth century. In A. D. 1042, Bhoja was still on the throne. We know not how soon he may not have ascended it after A. D. 993, when Munja, or Vákpati, his predecessor, was as yet in power.

A Rudras'aubhu is named in one of the Chedian inscriptions.

See last year's Journal, p. 319; and Colebrooke's Miscellaneous Essays, Vol. II. pp. 462, 463.



## INSCRIPTION III.

ओम् नमः शिवाय ।

संवत् १२२६ वर्षे वैशाखसुदि ३ सोमे । अद्येह आमदणहिलपदा-  
ङ्कसमस्तराजावलीविराजितमहाराजाधिराजपरमेश्वरपरममाहेश्व-  
रश्रीअजयपालदेवकल्याणविजयराज्ये\* तत्पादपद्मोपजीविमहामात्य-  
श्रीसोमेश्वरे श्रीश्रीकरणादौ समस्तमुद्राव्यापारान् परिपश्यतीत्येवं†  
काले प्रवर्तमाने निजप्रतापोपार्जितश्रीभाइल्लस्वामिमहाद्वादशकमण्ड-  
लप्रभुज्यमाने‡ अद्येह श्रीउदयपुरे तेनैव प्रभुणा नियुक्तदण्डश्रीलूणप-  
साकेन धौतवाससी परिधाय परमधार्मिकेण भूत्वा अक्षयवतीयायु-  
गादिपर्वणि मुहिलउतान्वये राजपुत्रश्रीवील्लहणदेवपुत्रपरमलोका-  
न्तरितराजश्रीसोलणदेवश्रेयसे अवत्यदेवश्रीवैद्यनाथाय भृङ्गारिका-  
चतुःषष्टिपथके पञ्चोपचारपूजानिमित्तं सवृत्तमालाकुलं दण्डजलाश-  
योपेतं§ चतुराघाटसमन्वितं उमरथाग्रामं॥ शासनेन प्रदत्तम् ।

आघाटा यथा अस्य ग्रामस्य पूर्वतो नाहग्रामं दक्षिणतो वहिडा-  
उग्रग्रामं पश्चिमतो देउलीग्रामं उत्तरतो लखणउडाग्राममेवं हि  
चतुःकङ्कटविशुद्धम्॥ ।

उक्तम् ।

बज्जभिर्वसुधा भुक्ता राजभिः सगरादिभिः ।

यस्य यस्य यदा भूमिस्तस्य तस्य तदा फलम् ॥ १ ॥

खदत्तां परदत्तां वा यो हरेत वसुन्धराम् ।

षष्टिवर्षसहस्राणि अमेध्ये जायते कृमिः ॥ २ ॥

भान्याता सुमहीपतिः कृतयुगेऽलङ्कारभूतो गतः ।

सेतुर्येन महोदधौ विरचितः क्वाऽसौ दशास्यान्तकृत् ।

\* The original has अजयपल. A little on is ०जोवी- also.

† Corrected from परिपश्यतीत्येवं. We have a strange word here. Others of the same kind are पथक and अनैष्टिक. The last qualifies a name near the end of the inscription, and seems to denote an office.

‡ One line ending with an erasure, and the next beginning with डल, I have not hesitated to assume, that the missing symbol was सं.

§ The ल in this compound is quite worn away ; and it has been inserted on conjecture.

॥ Here, and on several occasions below, a masculine substantive is turned into a neuter.

As is usual in documents of this sort, the laws of *sandhi* are freely neglected.

॥ The word कङ्कट, "boundary," survives, in Málava, in the same sense, under the form of कौकड.

अन्ये चाऽपि युधिष्ठिरप्रभृतयो यावद्भवा भूपतिर्  
नैकेनाऽपि समं गता वसुमती मन्ये त्वया यास्यति\* ॥ ३ ॥

इत्यादि परिभाव्य शासनमिदं पालनीयम् ।

यत्रमनैष्ठिकमहामहाराजकश्रीश्रीलकठरासिना उपार्जितमिदम् ।

This inscription I found in Udayāditya's magnificent temple to S'iva, at Udayapura in Gwalior. It is engraved in a bold hand, on a thick slab of stone, now detached from its original setting, and once contained at least twenty-two lines of writing, twenty and a half of which I print.

All that it has to communicate of value may be abstracted as follows. In the year 1229 of Vikramāditya, or A. D. 1172, the ruling sovereign was Ajayapála.† Someś'wara was his prime minister, general intendant of the royal signet, and governor of the twelve districts comprehended in Bháilla. At the time aforesaid,§ Lúnasasáka, a military officer appointed by Someś'wara, bestowed upon Vaidyanátha, surnamed Avatya, the village of Umarathá, in Bhṛingáriká. The donation was for religious uses, and was transacted at Udayapura.|| Umarathá was bounded on the east by Náha; on the south, by Vahidáuga; on the west, by Deulí; and on the north, by

\* For this stanza, and its traditional history, see last year's Journal pp. 202, 203, foot-note. There is an error in the end of its third quarter, as engraved and printed. A common reading for what is there corrupted is याता दिवं भूपते

† If the verb in this sentence means "ratified," or "counter-signed," it is without any classical warranty. The proper name is not over-distinct.

From the words यः कश्चिद् \* \* \* भवति, distinguishable after what is given above, I suspect that nothing is lost from the inscription, beyond a customary couplet, insisting, that its validity is not to be impugned on account of clerical deficiency or excess.

‡ Leading off his titles are words of which I can make nothing. A'madanahila may be a proper name.

Devapála, who calls himself Rájá, was reigning at Dhárá in A. D. 1353. See this Journal, for 1859, pp. 1—8. A Rájá Devapála has left his name carved in the Udayapura temple, with the date 1268 attached. If in S'aka, the time was A. D. 1346. Were Ajayapála and Devapála of the same family?

§ Circumstantially, on Monday, the third day of the light fortnight in Vais'ákha. That day is called *akshaya-tritíyá* and *yugádi*, as in the inscription. The term *yugádi*, "beginning of a cycle," is applied to four days in the year, the anniversaries of the commencements of the great cycles. The *yugádi* in question has reference to the *satya-yuga*.

|| The grant was, professedly, for the benefit of one Solana, of blessed memory, son of Vílhana, a Rájaputra, of the family of Muhila'uta. Solana and Vílhana may be supposed to have been father and grandfather of Lúnasasáka.

The donor stipulates for the observance, in behalf of some unnamed idol, of ceremonies involving the ritual employment of sandal, flowers, incense, lights, and edibles.



Lakhṇa'udá. Lakatharási, a person bearing the title of Bhaṭṭáraka, who was somehow connected with the instrument of gift, is named at its conclusion.

Bháilla, now Bhelsá, was the designation, in past times, of a large territory. The region which included it, being ruled, in A. D. 1172, by Ajayapála, was, doubtless, a new kingdom that had grown out of the dismemberment of the realm once dominated by Udayáditya. The kings of Málava who succeeded Udayáditya between A. D. 1104, and 1215, were Naravarman, Yas'ovarman, Jayavarman, Vindhavarman, Subhaṭavarman, and Arjuna; and no traces of their authority have come to light at Udayapura, or in its vicinity.

One day's march from Udayapura brought me to the place where I finish this paper. For the second time I have just read the old inscriptions here, in the column and on the gigantic stone boar. It has caused me no surprise to find, that my former decipherments of them admit of a few corrections.\*

\* See last year's Journal, pp. 14—22, and pp. 139—150.

In the opening stanza of the first inscription is a hiatus, the last letter before which I took to be न्य and supplied accordingly what was missing. But it is स्य, indubitably. स्यन्दन, a euphemism for "destruction," may be proposed as the original reading.

Immediately preceding the name of Indravishṇu, I thought I saw नृपम. Through the mutilation of the engraving on the column, I now think I can make out वृषम. On the boar, to be sure, where everything is very indistinct, there seems to be नृ: but both the inscriptions must, almost to a certainty, here exhibit the same word.

Four months after my first visit to Eran, writing under the guidance of my facsimile copy, I said of what looked to me like *sansurabhu*, that it "is doubtful in its penultimate syllable, and very doubtful in its final." Mr. Prinsep's lection is *sansuratam*. The result of a close re-examination of the word as it stands on the stone is this. The final syllable is clearly *tri*. The penultimate, judged by what is left of it in its damaged state, could not well have contained any consonant but *k* or *r*. The vowel, if it had one, may have been *á*, *e*, or *o*. Possibly the word was *sansurátri*; and it may be a plausible theory, that it was the name of the country which had the Yamuná and the Narmadá for two of its boundaries. Or is it a repetition of the date; an abbreviation of *samvat*, followed by three literal symbols of arithmetical value? If I had access to Mr. Thomas's edition of Mr. Prinsep's *Indian Antiquities*, it might be easy to say whether this last suggestion is of any account.

For several months I have had by me a photograph of the inscription in the Gwalior Fort, for which I have to thank Colonel Cunningham. Its paleography seems to be a little more recent than that of the monuments at Eran. It speaks of a Toramána, and of Mátricheta, son of Mátridása, son of Mátrinula. A specimen of it here follows:

अयति जलदखेलं ध्वान्तमुत्सारयन् खैः  
किरणनिवहजालैर्याम विद्योतयद्भिः ।

Those who are interested in the preservation of Indian antiquities will be grieved to hear, that, during the last fourteen months, the writing on the column has suffered irreparable injury. The boys of the village have invented a new amusement, in throwing stones at it; and at least a dozen letters that were complete, when last I was here, are now for ever obliterated.

*Camp Eran, Feb. 26, 1862.*

उद्यनगतटापं मण्डयन् यः स्वरागैः  
चक्रितगमनखेद्भ्रान्तचक्षुःश्रुतान्तैः ॥ १ ॥  
उद्यगिरिग व्याशयस्तचक्रार्तिहर्ता  
भुवनभवनदीपः शर्वरीनाशहेतुः ।  
तपितकनकवर्णैरंशुभिः पङ्कजानाम् ।  
अभिनवरमणीयं यो विधत्ते स वोऽव्यात् ॥ २ ॥

1. "Triumphant is he who, with his massed net-work of rays, lighting up space, dispels the darkness, sportive as rain-clouds, and adorns the peaks of the Eastern Mountain with his hues, the points of whose tremulous lustre are distracted with weariness from journeying in alarm.

2. "May he who, going *daily* to the Eastern Mountain, removes the distress of ruddy geese longing *for the return of day*; the illuminator of earth, as it were a mansion; destroyer of night; who, by his rays, in colour like melted gold, *incessantly* supplies new embellishment to the water lilies, protect you."

These lines come from a temple dedicated to the sun, to whom they are addressed. Poor in thought, they are also incorrect as to language. तपित is false Sanskrit for तप्त; and रमणीय is censurably used for रमणीयता. I do not apprehend, that the poetaster designed any the remotest allusion to the Udayagiri hill near Bhelsa.

The first letter that appears at the beginning of the inscription is a broken य; and nothing of उद्यनग remains except the उ and the shauks of the ग. But those are distinct.

To उद्यगिरि, in the second stanza, I have added, from pure conjecture, ०ग व्याशा-, as a substitute for stars. The third line shows an *upadhmaniya* before a प. In the teeth of all grammar, this, as lately edited, has been turned into a *repha*; and, further on, in what I do not print, मातापित्रोस्तया, most legibly photographed, has given place to मातापितृस्तया. Shade of S'akātāyana! See last year's Journal, pp. 275, 276.



*Rávana's Commentary on the Rig Veda, by FITZ-EDWARD HALL,  
ESQUIRE, D. C. L.*

*To the Secretary to the Asiatic Society of Bengal.*

*Bombay, April 11, 1862*

SIR,—Accompanying this note I send, for the Journal, some extracts from a commentary on the *Rig-veda*, by one Rávana. Time fails me to put into presentable shape for the press a translation of them, and remarks thereon, which I had hoped to communicate with the Sanskrit.

The extracts are contained in the *Paramórtha-prapá*, a volume of scholia, by Súrya Pandit, on the *Bhagavad-gítá*. Some account of Súrya, who lived in the first half of the sixteenth century, will be found in my *Contribution towards an Index to the Bibliography of the Indian Philosophical Systems*, pp. 119, 120.\* I have indicated numerically, by *mandala*, *súkta*, and *rich*, the passages of the *Rig-veda* which are expounded.

That a Rávana wrote annotations on some portion of the Veda, is hinted by Mallári. See the *Graha-lághava*, &c., Calcutta edition, p. 5. At Ajmere, at Gwalior, and elsewhere, pandits have, again and again, assured me of their having seen, and even of their having possessed, the whole of Rávana's commentaries on the *Rig-veda* and *Yajur-veda*. And I hesitate to conclude, that herein they were cretizing; as I am unable to conceive why they should have wished to deceive me.

On the authority of the *Bháva-prakás'a*, by Bháva Mis'ra, son of Latakana Mis'ra, some Rávana or other composed a *Kumára-tantra*. A work of like title, Bháva alleges, is ascribed to Sanatkumára.

Your obedient servant,

FITZ-EDWARD HALL.

\* The extracts, now given, were originally printed in a preface to this work which was subsequently cancelled.

तद्विष्णोः परमं पदं सदा पश्यन्ति सूरयः । दिवीव  
चक्षुराततम् ॥ १. २२. २०. ।

तद्विप्रासो विपन्यवो जागृवांसः समिन्धते । विष्णो-  
र्यत् परमं पदम् ॥ १. २२. २१. ।

अत्र रावणभाष्यम् । विष्णोर्यापनशीलस्याऽपि परमात्मनः । तत्  
परमं पारमार्थिकं पदं अभिव्यक्तिस्थानम् । दिवि मूर्ध्नि भूमध्ये  
वर्तते । त्रिपादस्यामृतं दिवीति श्रुतेः । सत्यज्ञानानन्दात्मकं विष्णोः  
पदम् । तत् किम् । यत् सूरयो महानुभावाश्चक्षुराततं वित्तृतमिव  
कृत्वा सदा अव्यवधानेन पश्यन्ति निरन्तरं साक्षात् कुर्वन्ति । यद्वा  
चक्षुरर्थप्रकाशकम् । इव एवकारार्थः । आततमपरिच्छिन्नमेव यथा  
स्यात् तथा पश्यन्ति । तत् तस्मात् । विप्रासो विप्राः श्रेष्ठमतयः । वि-  
पन्यवो मेधाविनः । जागराश्चकुरिति जागृवांसः दृश्यप्रपञ्चाद् दीर्घ-  
स्वप्नात् सकाशात् जागरं प्राप्ता इत्यर्थः । प्रोक्तवदनुभूयमानं पदं  
समिन्धते समृद्धिं नयन्ति सर्वात्मकत्वेन पश्यन्ति । अत्रैतदुक्तं भवति ।  
अभ्यासदशायां सुषुम्नाविवरेण भूमध्यं प्रापितया इष्टया पश्यन्ति ।  
व्यवहारदशायां तु सकलविषयप्रतीतिरूपेण तदेव पश्यन्तीत्यर्थः ।

द्वा सुपर्णा सयुजा सखाया समानं वृक्षं परिषस्वजाते ।  
तयोरन्यः पिप्पलं स्वाद्वत्त्यनश्नन्नन्यो अभि चाकशीति ॥

१. १६४. २०. ।

रावणभाष्यम् । अत्र लौकिकप्रसिद्धा दृष्टान्तेन जीवपरमात्मानौ  
सूयेते । यथा लोके द्वौ सुपर्णौ सुपतनौ शोभनगमनौ सयुजा समान-  
योगौ सखाया समानख्यानौ समानं वृक्षं एकं देहाकारवृक्षं परिष-  
स्वजाते आश्रयतः । तयोरन्यः एकः पिप्पलं फलं स्वादुतरमस्ति ।  
अपरः अनश्नन् अभिचाकशीति अभिपश्यति । तद्वत् द्वौ सुपर्णस्या-  
नीयौ क्षेत्रज्ञपरमात्मानौ सयुजा समानयोगौ । योगो नाम सम्बन्धः ।  
स च तादात्म्यलक्षणः । स एव आत्मा जीवात्मनः स्वरूपं एवमन्यस्या-  
ऽपि इद्वैकात्म्यम् । अतएव समानख्यानौ । यस्य यादृशं ख्यान



सुराणां परमात्मनः तदेवेतरस्याऽपि । अतएव सखायौ एकरूपप्रका-  
शावित्यर्थः ।

युवा सुवासाः परिवीत आगात् स उ श्रेयान् भवति  
जायमानः ।

तं धीरासः कवय उन्नयन्ति स्वाध्योऽमनसा देवयन्तः ॥

३. ८. ४. ।

रावणभाष्यम् । बाल्यवार्धक्याद्यैर्देहविकारैर्विरहितः युवा मुख्य-  
प्राणः । सुष्ठु वासः प्रावरणं यस्य सत्त्वाकारान्तःकरणवृत्तिप्रतिबिम्बित-  
शरीरावृतः सन् । आगात् जीवदशां प्राप्तः । उ इति निश्चयेन ।  
स जायमानः प्रादुर्भूतः सन् सत्कर्मनिरतो भवति । स स्वाध्यः सुखे-  
नाऽऽराध्यः । तमेवंविधम् । धीरासः दृढव्रताः । कवयः क्रान्तदर्शिनो  
क्षानिनः । देवयन्तो देवत्वं प्राप्तुमिच्छन्तः । मनसा सह उन्नयन्ति  
सुषुम्नाविवरेण ऊर्ध्वं नयन्ति ।

यस्तित्याज सचिविदं सखायं न तस्य वाच्यपि भागो  
अस्ति ।

यदीं शृणोत्यलकं शृणोति न हि प्रवेद सुकृतस्य प-  
न्याम् ॥ १०. ७१. ६. ।

रावणभाष्यम् । अत्र सचिशब्दः सखिव चो । सचीन् सखीन्  
परमप्रेमास्पदान् विषयान् वेत्तीति सचिवित् । तमुपकारकम् । अत-  
एव सखायं परमात्मानम् । यः पुरुषः तित्याज त्यक्तवान् । आत्मबहि-  
र्मुख इत्यर्थः । तस्य पवनात्मिकायामपि वाचि सत्यत्वभागो नाऽस्ति ।  
किंपुनर् जल्यरूपायाम् । तथा ईम् इत्ययं बहिर्मुखः यच्छृणोति  
शास्त्रश्रवणं करोति । तदलकमलीकमसत्यम् । हि यस्मात् कारणात् ।  
स सुकृतस्य सत्यस्य ब्रह्मणः । पन्थां पन्थानं मार्गम् । न प्रवेद न जा-  
नति । तथा मुह्यन्त्यन्ये अभितो जनासः । इहाऽस्माकं मयवा  
सूरिरस्त्विति ।

हृदा तष्टेषु मनसो जवेषु यद्वाह्याः संयजन्ते सखायः ।  
अत्राहृत्वं विजहुर्वेद्याभिरोक्षब्रह्माणो विचरन्त्यु त्वे ॥

१०. ७१. ८. ।

इमे ये नाऽर्वाङ् परश्चरन्ति न ब्राह्मणासो न सुतेक-  
रासः । त एते वाचमभिपद्य पापया सिरीस्तन्त्रं तन्यते  
अप्रजज्ञयः ॥ १०. ७१. ८. ।

रावणभाष्यम् । हृदा बुद्धिरूपेण मनसा । तष्टेषु निराकृतेषु । मनसो  
जवेषु वृत्तिरूपेषु मनोवेगेषु सत्सु । यत् यस्मात् कारणात् । ब्रा-  
ह्मणाः ब्रह्मज्ञाः । सखायः सर्वभूतसुहृत्तमाः सन्तः । सम्यक्प्रकारेण  
यजन्ते । अन्तर्यागं कुर्वते । तत्राऽन्तर्यागे क्रियमाणे किं भवतीत्याह ।  
अत्रेति । अत्र अह त्व इति पदविभागे अहेत्यत्राऽनुस्वारलोपश्चान्दसः  
अहन्वं विजहुः अन्तर्यागेन भेदभावनां त्यक्तवन्तः । किम्भूताः  
वेद्याभिर्विद्याभिः ज्ञानवृत्तिभिः । अभि ऊह्यं ब्रह्म यैस्ते । पदार्थ-  
प्रतीतिरूपेण ज्ञातब्रह्माणः सन्तः । उ इति निर्धारणे । त्वे एकत्वे ।  
विचरन्ति अखण्डैकरसत्वेन व्यवहरन्ति । तदुक्तमागमेऽपि ।

स्वाधिष्ठानगते कुण्डे चिद्रूपं वज्रमुज्ज्वलेत् ।

जुहुयात् प्रणवेनाऽत्र त्वमहन्तां निवेदयेत् ॥

आत्मन्याऽऽत्मानमद्वैते भूत्वा सच्चित्सुखात्मकः ।

स्थीयते यत् कियत्कालं सोऽन्तर्यागः स्मृतो बुधैः ॥ इति ।

इमे य इति । इमे ये उक्तलक्षणाः पुरुषाः ते । अर्वाङ् मनुष्यलोके ।  
न चरन्ति न सम्भवन्ति । न पर इति सकारान्तमथयम् । परस्मिन्  
देवलोकेऽपि नोत्पद्यन्ते । कृताकृतैः कर्मभिरुत्तमाधमलोकं न गच्छन्ति  
किन्त्वत्रैव ब्रह्मीभूतास्तिष्ठन्तीत्यर्थः । न तस्य प्राणा उत्क्रामन्त्यत्रैव  
समवलीयन्त इति श्रुतेः । परन्तु ब्राह्मणाः जातिमात्रविप्राः । तथा  
सुतं सोमम् अभिवृतं कुर्वन्तीति सुतेकरास्त एव सुतेकरासो  
याज्ञिकान्तथा न भवन्ति । किन्तु ते उत्तमाधमगतिं प्राप्नुवन्त्येवे-  
त्यर्थः । अत्र हेतुमाह । त एत इति । त एते निरूपितप्रकारा ब्रा-  
ह्मणाः सुतेकराश्च । वाचं फलप्रतिपादिकाम् वेद्याणीम् । अभिपद्य  
ज्ञात्वा । सिरीः \*सारिणः छधिकर्तार इव भूत्वा पापया फला-



शया । तन्नं यज्ञादिकं तन्वते विस्तारयन्ति । अतएव अप्रजज्ञयः न प्रकृष्टा जज्ञिः जन्म एषां ते अपकृष्टजन्मान इत्यर्थः ।

सर्वे नन्दन्ति यशसागतेन सभासाहेन सखा सखायः ।

१०. ७१. १०. ।

रावणभाष्यम् । न तस्य प्रतिमाऽस्ति तस्य नाम महद् यश इति श्रुतेः यशसा परमात्मना । आगतेन प्राप्तेन । सर्वं देहिनो नन्दन्ति । परमानन्दाप्नुता भवन्ति । किम्भूतेन सभासाहेन सभामिन्द्रिय-सभां लौकिकव्यवहारं वा सहते आक्रमते तथाविधेन । पुनः किम्भू-तेन सखा उपकारकेण । किम्भूताः सर्वे सखायः सर्वभूतसुहृत्तमाः । तथा च सर्वभूतसुहृत्तमत्वमेवाऽऽत्मप्राप्तेर्निदानम् । न तूत्तमाधमत्व-मिति ।

आविरभून् महि माघोनमेषां विश्वं जीवं तमसो  
निरमोचि ।

महि ज्योतिः पितृभिर्दत्तमागादुरुः पन्था दक्षिणाया  
अदर्शि ॥ १०. १०७. १. ।

अत्र रावणभाष्यम् । एषामाचार्याणां माघोनं महि आविरभूत् । इन्दति जानाति इति व्युत्पत्त्या मघोन इन्द्रस्य परमात्मन इदं माघो-नम् । महि महत्त्वम् । आविरभूत् आविर्भूतं । कुत इत्यत आह । महोति । महि महत्त्वम् । ज्योतिर्ज्ञानं पितृभिरस्माभिर्दत्तं सत् आगात् प्राप्तम् । तेष्वाचार्येषु परिणतम् । येन ज्योतिषा विश्वं जीवं सर्वं जगत् । तमसोऽज्ञानात् निरमोचि निर्मोचितम् । अथ कथम-स्माभिस्तेभ्य एवाऽर्पितमित्याह । तैः उरुर्निरवधिकफलो दक्षिणायाः पन्था मार्गः अदर्शि दृष्टः । मोक्षार्थिभ्य आत्माख्यदक्षिणाया मार्गस्य फलं निरवधिकमिति ज्ञातमित्यर्थः ।

चतुष्कपर्दी युवतिः सुपेशा घृतप्रतीका वयुनानि वस्ते ।  
तस्यां सुपर्णा वृषणा निषेदतुर्यच देवा दधिरे भाग-  
धेयम् ॥ १०. ११४. ३. ।

एकः सुपर्णः स समुद्रमाविवेश स इदं विश्वं भवनं

विचष्टे। तं पाकेन मनसा ऽपश्यमन्तितस्तं माता रेत्स्हि  
स उ रेत्स्हि मातरम् ॥ १०. ११४. ४. ।

रावणभाष्यम्। चत्वारः कपर्दा उत्कर्षा यस्याः सा चतुष्कपर्दा  
पूर्वोपक्रान्ता माया। अथ तानेवोत्कर्षानाऽऽह। युवतिरित्यादि।  
युवतिः सदा तरुणी। कदापि वार्धकं न प्राप्नोति। अग्रमेक  
उत्कर्षः। तथा सुपेशा सुतरां पेशा सुपेशा कुशला अघटनघटना  
पटीयसी। तदुक्तम्।

यथा स्वप्नमुहूर्ते स्यात् संवत्सरशतभ्रमः।

तथा मायाविलासोऽयं जायते जाग्रतिभ्रमः ॥ इति।

अविद्या च तथा विद्या जीव ईश्वर एव च।

तत्कृतौ बन्धमोक्षौ च घडस्माकमनादयः ॥ इति।

अयं द्वितीय उत्कर्षः। तथा घृतप्रतोका घृतवन्मिष्टं प्रतीकमुपक्रमो  
यस्याः सा परिणामे विधोपमेत्यर्थः। अग्रमेव तृतीय उत्कर्षः। तथा  
वयुनानीति वयुनानि ज्ञानानि। वस्ते ह्लादयति। तद्विपरीतस्व-  
भावत्वात्। तर्हि चतुस्तुत्कर्षवती मायैवाऽस्ति कथमीश्वरप्रसिद्धिरि-  
त्याह। तस्यामिति। तस्यामुक्तलक्षणायां मायायाम्। सुपर्णा सुपर्णौ  
शोभनपतनौ। जीवेश्वरौ। पक्षिणाविव वृषणौ सदसत्फलवर्षि-  
तारौ। द्विवचनस्य वा ह्रन्दसीत्यात्वम्। निषेदतुर्निषमौ स्थितौ। कुतो  
ज्ञातमेतदत आह। यत्रेति। यत्रत्यं भागधेयमर्थप्रकाशसामर्थ्यम्।  
द्योतयन्त्यर्थान् प्रकाशयन्ति। ते देवाश्चक्षुराद्याः। दधिरे घृतवन्तः।  
अनेन ज्ञाननिरोधनकर्त्र्या मायायाः सकाशात्। ईश्वरस्य वैलक्षण्यं  
द्योतितम्। अथ सुपर्णाविति द्विवचनेनेश्वरस्य द्वैविध्यमापन्नम्।  
तत् परिहरति। एक इति। वस्तुतः सुपर्ण एक एव। स समुद्र-  
माविवेश समुदयति तिरोधत्ते। एवंविधं प्रपञ्चमाविवेश। तत् सृष्ट्वा  
प्राविशदिति श्रुतेः। स इदं भुवनं स्थूलप्रपञ्चभूतम्। विचष्टे ज्ञातवान्।  
तं पाकेन परिपक्वेन बुद्धिरूपेण मनसा। अन्तितः अभ्यन्तरतः।  
यावदपश्यमद्राक्षं तावत् तं सुपर्णम्। माता माया। रेत्स्हि। लिह  
आखादने। विसर्गेति (?) विष्टजति त्यजति। तथा उ इति निश्चि-  
तम्। सुपर्णः मातरं विष्टजति। द्विवचनं तु तादात्म्यविषयकम्।  
अतएव अग्रतो वक्ष्यति। सुपर्णं विप्राः कवयो वक्षोभिरेकं सन्तं बज्रधा  
कल्पयन्तीत्यादि।



*Contributions to Indian Malacology,\* No. III. Descriptions of new operculated land-shells from Pegu, Arakan and the Khasi hills.*—  
BY WILLIAM T. BLANFORD, F. G. S.

1. *ALYCÆUS INGRAMI*, n. s.

Testa late umbilicata, conoideo-depressa, acute sinuato-costulata, albida, interdum rubello-albida, versus apicem ferruginea, vix translucens. Spira conoidea, apice obtusula, sutura parum profunda. Anfr. 4 convexi, ultimus ad peripheriam sub compressus, ad latus mediocriter tumidus, ibidem confertissime costulatus, tum constrictus, prope aperturam non descendens. Spatium constrictum† longitudinis mediocris, costulatum, medio tumidum; tubulum suturale mediocre,  $\frac{1}{4}$  peripheriæ subæquans. Apertura obliqua, circularis: peristoma duplex; externo breviter incrassato-expanso; interno expansiusculo, continuo. Operculum fusco-corneum, multispirum, externe perconcaum, nucleo centrali intus prominente papillari.

|             | millemetres    |    | inch |
|-------------|----------------|----|------|
| Diam. maj.  | 6              | or | 0.24 |
| „ min.      | 5              |    | 0.2  |
| Alt.        | $3\frac{1}{4}$ |    | 0.13 |
| Aper. diam. | $1\frac{3}{4}$ |    | 0.07 |

Habitat prope Tongoop in Arakan.

The present belongs to the typical group of *Alycæus*, according to Mr. Benson, and is most nearly allied to *A. umbonalis*, B. from Pegu. It is distinguished from that species by its more raised spire, smaller size, shorter sutural tube, and shallower suture, by its less oblique mouth and non-descending last whorl, and by its duplex slightly expanded peristome, which contrasts strongly with the broadly reversed lip of *A. umbonalis*. That species also has the upper whorls much more closely, but less sinuously costulated than are those of *A. Ingrami*. In the subangulation of the last whorl at the periphery there is some resemblance to the little Thayet Myo *A.*

\* My brother having left India, I have no longer the advantage of his co-operation in the publication of these "contributions." In consequence of his absence, I fear that I shall be unable in future to add drawings of the shells described.

† By *Spatium constrictum* or *strictura* in these descriptions of *Alycæi*, the whole constricted space from the peristome to the origin of the sutural tube is to be understood.

*sculptilis*, B. which, however, is easily distinguished by the characters of its crenulated peristome, besides other peculiarities.

The *Alycæus* from the Andaman islands lately described by Mr. Benson (Ann. and Mag. Nat. Hist. for January, 1861) probably resembles *A. Ingrami* in size and general shape. I have not had the opportunity of seeing *A. Andamanice*, B. which is, however, clearly distinct from the present species on account of the characters of the spire, suture, sculpture, &c.

I have much pleasure in naming this form after Captain Ingram, to whom I am indebted for a very large collection of shells, chiefly from Arakan and the Arakan hills, and embracing altogether about 50 species, several of which had escaped my own search.

*A. Ingrami* was found in only one spot, viz. in earth at the sides of a large mass of limestone about 3 miles S. W. of Tongoop. There it was abundant

## 2. ALYCÆUS HUMILIS, n. s.

Testa aperte umbilicata, turbinato-depressa, lævis, rubello-succinea, ad apicem sanguinea. Spira conoidea, apice obtusula, sutura profunda. Anf.:  $3\frac{1}{2}$  rotundati, ultimus ad latus mediocriter inflatus et confertim costulatus, tum constrictus, versus aperturam breviter descendens. Strictura glabra, longa, antice tumidior. Tubulum suturale breve,  $\frac{1}{6}$  peripheriæ subæquans. Apertura obliqua, circularis; peristoma duplex; externo retro-relicto, interno continuo, porrecto, fere solute. Operculum corneum, multispirum, externe concavum.

|              | mm.            | inch   |
|--------------|----------------|--------|
| Diam. maj.   | $2\frac{1}{2}$ | or 0.1 |
| „ min.       | 2              | 0.08   |
| Alt.         | $1\frac{1}{2}$ | 0.06   |
| Apert. diam. | $\frac{2}{3}$  | 0.025  |

Hab. ad Akouktoung, ad ripas fluminis Irawaddi, in provincia Burmana Pegu.

A solitary specimen of this species, slightly weathered and shewing more sculpture than usual, was found by me in April, 1861, close to Myanoung, on the banks of the Irrawaddy. With it I found a few other shells; amongst them a small variety of *Bulimus cænopictus*, Hutt. and as this shell is not known to inhabit Pegu, but has since occurred to me in the neighbourhood of Ava, I was inclined to suppose that *A. humilis* was also derived from that neighbourhood.



Lately, however, during a hurried search at Akouktoung, I had the good fortune to find some living specimens of what, I have little doubt, is the same species as that which I first obtained, the only difference being the absence of any sculpture except on the tumid portion of the last whorl. From those specimens the above description has been corrected.

*A. humilis* resembles somewhat the minute *A. armillatus*, B. but differs in the very much greater distance to which the strongly marked costulation upon the tumid portion of the last whorl is carried back from the constriction, the distance being in both species proportional to the length of the sutural tube. *A. humilis* is further distinguished by its longer constriction, by the descent of the mouth, and the greater tumidity of the last whorl. The colour, as in many *Alycæi*, is probably not quite constant, some specimens being white and translucent.

With *A. humilis* at Myanoung I found a single broken specimen of another *Alycæus* which resembles the singular little Darjiling *A. plectocheilus* in the form of the peristome. The specimen being imperfect and weathered, I delay publishing a description of it in the hopes of succeeding in obtaining better specimens before doing so.\*

### 3. ALYCÆUS GRAPHICUS, n. s.

Testa perforata, ovato-globosa, tenuis, pallide fulva, costulis filaribus subremotis sinuatis ornata. Spira ovato-conoidea, lateribus convexis, apice obtusula, sutura impressa. Anfr. 4, rotundati, 2 primi lente, penultimus et ultimus celerius accrescentes, ultimus ad latus vix tumidus, pone stricturam spatio brevissimo confertius costulatus, tubulum suturale brevissimum gerens. Spatium constrictum læve, costulâ filiformi unâ medio plerumque signatum, prope aperturam tumidius. Apertura vix obliqua, majuscula, circularis; peristoma duplex; interno breviter porrecto, continuo; externo expanso, retro relicto, ad umbilicum reflexo, perforationem partim celante.

|              | mm. |    | inch |
|--------------|-----|----|------|
| Diam. maj.   | 3   | or | 0.12 |
| „ min.       | 2½  |    | 0.1  |
| Alt.         | 3   |    | 0.12 |
| Apert. diam. | 1½  |    | 0.06 |

\* It is perhaps the same as a species since found in Upper Burma.

Habitat in montibus Arakanensibus provinciam Burmanam Pegu ab Arakan secernentibus.

A Burmese representative of the little Darjiling group of *Alycæi*, which comprises *A. constrictus*, B. *A. Bembex*, B. and *A. Otiphorus*, B. *A. graphicus*, although much more globose than any of the others, is in some respects intermediate between *constrictus* and *Otiphorus*, resembling the first in size and somewhat in form, and the latter in the reflexed left edge of the outer peristome. This character, however, is by no means so much developed in the Burmese as in the Darjiling species. The present has a more marked sculpture than either of its three allies and differs from them also in the very slight approximation of the costulation behind the constriction. Almost all the species of the genus *Alycæus*, are more closely and strongly marked upon the tumid portion of the last whorl than on any other part of the shell, the length of the closer ribbing and of the tumidity having a general relation to that of the sutural tube.\*

Several dead specimens of *A. graphicus* were found at Moditoung, a halting-place about 55 miles from Prome, on the road across the uninhabited Arakan Yoma range from that place to Tongoop.

#### 4. ALYCÆUS VESTITUS, n. s.

Testa subanguste umbilicata, turbinata, solida, epidermide deciduâ, crassâ, subtestaceâ, sordide albidâ, conferte, ad spatium inflatum confertissime costulatâ, induta, sub epidermide rubella, lævis, spatio inflato costulato-striata. Spira conoidea, apice obtusa, sutura impressa. Anfr.  $4\frac{1}{2}$  rotundati, ultimus teres, ad latus parum inflatus. Strictura brevis, versus aperturam vix tumidior. Tubulum suturale mediocre. Apertura fere verticalis, circularis, majuscula: peristoma duplex; interno continuo, externo expansulo, ab interno sulco separato, ad anfr. penultimum breviter interrupto.

|              | mm.            | inch   |
|--------------|----------------|--------|
| Diam. maj.   | 5              | or 0.2 |
| „ min.       | $3\frac{1}{2}$ | 0.14   |
| Alt. vix     | 3              | 0.12   |
| Apert. diam. | $1\frac{1}{2}$ | 0.06   |

Hab. in montibus Arakanensibus.

Var. minor. Diam. maj. 4, min. 3, Alt.  $2\frac{1}{4}$  m.m.

\* *A. otiphorus*, B. is not costulated, but simply, closely and regularly striated throughout, rather more closely and costulately on the inflation.



Hab. cum *A. graphico* ad Moditoung.

But a single specimen of each variety was found. The first was obtained on the banks of the Pado Khyoung, a stream running from the Arakan range on the Pegu side in the district of Henzada. A single specimen either of another variety, or of a distinct but closely allied species occurred to me on the banks of another stream, the Alon Khyoung, lying between the two previously mentioned localities. This form differs in having a simple lip, and, apparently, a longer sutural tube. None of the specimens are quite fresh, although all are in fair condition and unbleached. Of the epidermis only traces remain on both shells.

This species is not affined to any known form. It is perhaps nearer to the little group to which *A. graphicus* belongs than to any other, but it has not the short sutural tube nor the ovately conoid form which characterizes that section of the genus. The shortness of the constriction, and the very slight degree in which it expands towards the aperture, connect this form somewhat with the section *Dioryx* of Mr. Benson.

##### 5. *ALYCÆUS SUCCINEUS*, *n. s.*

Testa aperte umbilicata, depresso-turbinata, acute sinuato-costulata, succinea, translucens. Spira conoidea, apice obtusula, sutura impressa. Anfr. 4, ultimus ad latus inflatus, ibidem confertissime costulatus. Strictura longa, medio tumida, et duobus vel tribus costulis obliquis, sulculis internis correspondentibus, signata. Tubulum suturale mediocre,  $\frac{1}{4}$  peripheriæ subæquans. Apertura obliqua, irregulariter circularis, superne subangulata: peristoma duplex; interno continuo, incrassato, expansulo, margine dextro bis obtuse angulato, ad basin canaliculo haud intrante perforato; externo breviter expanso, retro relicto.

|            | mm.            |    | inch |
|------------|----------------|----|------|
| Diam. maj. | 5              | or | 0.2  |
| „ min.     | 4              |    | 0.16 |
| Alt.       | $3\frac{1}{4}$ |    | 0.13 |
| Ap. diam.  | $1\frac{1}{2}$ |    | 0.06 |

Habitat in montibus Arakanensibus.

Some of the peculiarities of this species, such as the canaliculate base of the peristome, and the two or three small plaits on the constrictions are repeated in that next described. The plaits or ridges

just referred to, although they have corresponding internal hollows, are scarcely so prominent as those forming the sculpture of the upper portion of the shell. They are nearer to the mouth than to the rise of the sutural tube, and rest upon a tumidity which is scarcely sufficiently pronounced to enable the species to be assigned to the section *Charax* of Benson, although it exactly represents the well marked ridge in the undermentioned species *A. polygonoma*. The sutural tube is, in one specimen, somewhat short of the typical length.

Of *A. succineus*, I only obtained 4 specimens. They occurred at Moditoung together with *A. graphicus*, &c. All were dead, but in fresh condition.

#### 6. *ALYCÆUS POLYGONOMA*, *n. s.*

Testa aperte et perspective umbilicata, turbinata, radiato-striata, rubello-succinea. Spira conica, apice obtusula, sutura profunda. Anfr. 4 rotundati, ultimus ad latus valde inflatus, ibidem confertissime et acute costulatus; spatium constrictum longitudinis medio-cris, costulato-striatum, medio in costam prominentem, intus cavo-sulcatam, 2 vel 3 costulis signatam, tumescens. Tubulum suturale mediocre,  $\frac{1}{4}$  peripheriæ subæquans. Apertura obliqua, polygonalircularis, basi valde antice sinuata; peristoma duplex; interno vix porrecto, margine dextro ter subangulato, basi subcanaliculato; externo incrassato-expansulo, processu brevi, acuto, basali munito.

|            | mm.            | inch   |
|------------|----------------|--------|
| Diam. maj. | 5              | or 0.2 |
| „ min.     | $4\frac{1}{4}$ | 0.17   |
| Alt.       | $3\frac{1}{2}$ | 0.14   |
| Ap. diam.  | $1\frac{3}{4}$ | 0.07   |

Hab. in montibus Arakanensibus.

This species is allied to the last described but is distinguished by its higher spire, less marked sculpture, by the strong ridge on the constriction, and by the more polygonal aperture. The incision of the base, however, is slighter, and, in this species, accompanied by a slight corresponding projection beneath, which represents, on a small scale, the large ear-like basal process in *A. prosectus* Bens. from the Khasi Hills. The inner peristome of that species also has a slight basal indentation within the aperture.

I am indebted for a few perfect specimens of this species to Captain Ingram, who found them upon the Western side of the Arakan range.



I obtained one imperfect specimen at Shoukbeng on the Prome and Tongoop road, close to the summit of the hills.

7. *ALYCÆUS NITIDUS*, n. s.

Testa anguste umbilicata, depresso turbinata, solidula, fulvo-cornea, nitida, polita, translucens. Spira conoidea, lateribus convexis, apice obtusa, sutura impressa. Anfr. 4 convexi, ultimus ad peripheriam subangulato-compressus, subtus planulato-convexus, ad latus breviter tumidus, ibidem confertissime costulatus. Spatium constrictum longum, nitidum, lirâ retro-recumbente, parum elevatâ, prope regionem inflatam munitum. Tubulum suturale breve. Apertura diagonalis, undata, circularis. Peristoma ad basin antice, superne prope anfractum penultimum retro sinuatum, duplex; interno continuo, breviter porrecto, basi canaliculato; externo expanso, retro relicto, in processum auriformem subtus producto. Operc. tenue, corneum, multispirum.

|            | mm. | inch    |
|------------|-----|---------|
| Diam. maj. | 3½  | or 0.14 |
| „ min.     | 3   | 0.12    |
| Alt.       | 2½  | 0.09    |
| Ap. diam.  | 1   | 0.04    |

Hab. prope Tongoop in Arakan.

This very pretty and distinct little species occurred rarely at the roots of trees near Thaloo and Bandiyo, on the Prome and Tongoop road, not far from the last-named place. It combines the canaliculate inner peristome of *A. succineus* with an ear-shaped process like that at the base of *A. polygonoma*, while the ridge on the peristome is curved backwards in a similar manner to that in *A. hebes*, Bens. *A. gemmula*, Bens. and *A. Footei*, Blanf. although much less elevated than in either of those species, to which the shell now described has otherwise but little resemblance. The somewhat flattened base is peculiar.

The preceding 7 species shew how numerous must be the forms belonging to this peculiar and well marked little genus. Ten species, including *A. umbonalis*, *armillatus* and *sculptilis* of Mr. Benson, have now been described from the partially explored provinces of Pegu and Arakan.\*

\* Since the above was written I have obtained 2 more species from Upper Burma.

8. *ALYCÆUS THEOBALDI*, n. s.

Testa aperte umbilicata, conoideo-depressa, corneo-albida, translucens, costulis elevatis, sinuatis, remotis ornata, inter costulas striatula. Spira depresso-conica, apice obtusula, sutura impressa. Anfractus  $3\frac{1}{2}$  convexi, ultimus ad latus mediocriter tumidus, ibidem confertissime costulatus. Spatium constrictum longum, striatulum, medio tumidum. Tubulum suturale mediocre,  $\frac{1}{4}$  peripheriæ subæquans. Apertura obliqua, expandens, circularis; peristoma ad anfractum penultimum breviter interruptum, marginibus callo junctis, duplex; externo expansulo, interno breviter porrecto. Operc: corneum, multispirum, externe perconcaum, nucleo centrali interno prominente papillari.

|            | mm.            |    | inch |
|------------|----------------|----|------|
| Diam. maj. | 4              | or | 0.16 |
| Do. min.   | $3\frac{1}{4}$ |    | 0.13 |
| Alt.       | $2\frac{1}{2}$ |    | 0.1  |
| Ap. diam.  | $1\frac{1}{4}$ |    | 0.05 |

Hab. cum *A. hebeti* in montibus Khasi, teste W. Theobald, Jun.

I received two specimens of this species from Mr. Theobald as *A. hebes*, Bens. of which they were supposed to be young shells. They, however, prove, on closer examination, to be fully grown and distinct, the slight swelling in the centre of the constriction contrasting strongly with the high recurved ridge in *A. hebes*. This alone would shew the present to be a different species, but it is also distinguished by its lower spire, narrower umbilicus, smaller size, and thinner and interrupted peristome, the last character not occurring in any other species of the genus. The well-marked distant costulation of the upper whorls of *A. Theobaldi* is entirely wanting in *A. hebes*. The operculum of the latter does not appear to have been described. A single specimen in my possession is dark horny, indistinctly multispiral, extremely concave in front, and convex, almost conical, behind, and deficient in the central internal boss so prominent in most *Alycæi*.

Although there is a swelling in the centre of the constriction in *A. Theobaldi*, it does not amount to a marked ridge, such as characterizes the typical forms of the section *Charax* of Mr. Benson, e. g. *A. stylifer*, B. It is consequently not clear whether this species should be classed with the members of that section, or with those of



the typical group. Several species indeed tend to connect these two subdivisions, which more recent discoveries have rendered less distinct than they appeared to be when first described.

9. *CYCLOPHORUS PATENS*, *n. s.*

Testa subanguste umbilicata, globoso-turbinata, nitida, subglabra, oblique striatula, subtilissime decussata, albida, plerumque obsolete fulvo-strigata, fasciâ unicâ, 2-3 m.m. latâ, nigricante castaneâ, infra peripheriam circumdata; rarius superne purpurascenti-castaneo-picta vel strigata, subtus castanea, periomphalo solo albido. Spira conica apice acutiuscula, sutura impressa. Anfr. 5-5½ convexi, ultimus rotundatus, vix descendens; umbilicus pervius. Apertura fere verticalis, circularis, intus flaveola, peristoma simplex, breviter adnatum, sublate angulatim planulato-expansum, margine columellari reflexum, fulvum, læte aurantiacum vel flammeum. Operc. distincte 6-spiratum, corneum, nucleo centrali interno minime prominente.

|                               | m.m. | inches | m.m.        | inches  |
|-------------------------------|------|--------|-------------|---------|
| Diam. maj. (exempli majoris,) | 38   | or 1.5 | minoris, 29 | or 1.15 |
| „ min. „                      | 29   | 1.1    | „ 21        | 0.82    |
| Alt.                          | 26   | 1      | „ 19        | 0.75    |
| Ap. diam. intus,              | 17   | 0.6    | „ 13        | 0.5     |

Hab. circa Thayet Myo, Prome, et Henzada in provinciâ Pegu.

This species is remarkable for its flat, disk-shaped expanded peristome, usually of a bright orange or scarlet colour, and for the absence of marked sculpture, and, in most specimens, of any conspicuous coloration, except a single broad dark chesnut stripe below the periphery.

10. *DIPLOMMATINA SPERATA*, *n. s.*

Testa dextrorsa, non rimata, ovato-conica, subfusiformis, solidiuscula, pallide cornea, subremote verticaliter costulata. Spira conica, apice acuta, sutura impressa. Anfr. 6½ convexi; antepenultimus major, tumidus; ultimus antice vix ascendens. Apertura verticalis, subtus antice sinuata, late auricularis, plicâ columellari validâ munita; perist: subduplex, expansum, margine columellari sinuato et ad basin angulo acuto desinente, callo parietali mediocri.

|           | m.m. | inch    |
|-----------|------|---------|
| Long.     | 2½   | or 0.09 |
| Diam.     | 1½   | 0.05    |
| Ap. diam. | ½    | 0.02    |

Hab. in montibus Arakan a Pegu secernentibus.

But two perfect specimens of this shell occurred to me at Moditong on the Prome and Tongoop road, together with *Alycæus graphicus*, &c. It resembles *D. pachycheilus*, B. in the shape of the mouth, but is distinguished by the slighter rise of the last whorl, and by its subremote costulate sculpture, which, together with its less rounded aperture, serves also to distinguish it from *D. diplocheilus*, B. *D. pullula*, B. and *D. Blanfordiana*, B. the two latter of which are closely costulated, and the first named smooth.

I have met with two other species of *Diplommatina* in Pegu, both apparently undescribed.\* The genus had not previously been met with in the Burmese peninsula.

During the past year (1861) I have found *Hydrocena pyxis*, B. as far South as the neighbourhood of Henzada. *Cyclophorus fulguratus*, Pfeiffer, *C. Theobaldianus*, B. and *C. patens*, appear to occur, the former abundantly, the others sparingly, throughout the greater portion of Pegu, west of the Irrawaddy. A small *Pupina* is common at Thondoung near Thayet Myo and in several places further south.

*Leptopoma aspirans*, B. occurs among Captain Ingram's Arakan collections. Two large species of *Cyclophorus*, one of which may perhaps be a variety of *C. aurantiacus*, Schum. were found near Tongoop. A solitary specimen of a small *Helicina*, allied to *H. Andamanica*, B. was obtained from Ramri Island.†

Thayet Myo, August, 1861.

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Since the above paper has been written, undescribed forms have accumulated upon my hands. Of these the most interesting are a second species of the genus *Hypselostoma* from Ava, whence I have also had the good fortune to obtain two more *Alycæi* and two *Diplommatinæ*, as well as a very singular little operculate shell allied to the anomalous *Pterocyclos hispidus*, Pearson. Two new species of *Helix* of the section *plectopylis* of Benson have also occurred to me and a very considerable number of other novelties.

Bassein, March, 1862.

\* Two other distinct species have since been obtained in Upper Burma.

† Both *Leptopoma aspirans* and the small *Helicina* referred to above, have since been found abundantly in the South Western extremity of Pegu. They are there associated with the Darjiling and Khasi *Helix plectostoma*, B.



## ERRATA

*In Contributions to Indian Malacology, No. II. Vol. XXX.  
pp. 347d—366.*

| <i>Page</i> | <i>Line</i>                                                              |                                                                                                                                    |
|-------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 347d        | 24                                                                       | from top <i>for</i> Madras and Calcutta <i>read</i> Madras to Calcutta.                                                            |
| „           | 25                                                                       | from top and p. 348 line 5 from top <i>for</i> Alycœus <i>read</i> Alycæus.                                                        |
| 348         | 8                                                                        | from bottom <i>for</i> anfractos intenos <i>read</i> anfractus internos.                                                           |
| 349         | 2                                                                        | from top <i>for</i> recumbentem; peristomatis <i>read</i> recumbentem, peristomatis.                                               |
| „           | 4                                                                        | from top <i>for</i> sutaralis <i>read</i> suturalis.                                                                               |
| „           | 14                                                                       | from bottom <i>for</i> 40 <i>read</i> 30.                                                                                          |
| „           | 8                                                                        | from bottom <i>for</i> Pl. I. fig. 4 <i>read</i> Pl. I. fig. 6.                                                                    |
| „           | 5                                                                        | from bottom <i>for</i> Aufr. <i>read</i> Anfr.                                                                                     |
| „           | 2                                                                        | from bottom <i>for</i> perist-rectum <i>read</i> perist. rectum.                                                                   |
| 350         | 6                                                                        | from top <i>for</i> flammens <i>read</i> flammeus.                                                                                 |
| „           | 13                                                                       | from bottom <i>for</i> Leptopomas <i>read</i> Leptopomas.                                                                          |
| 351         | 18                                                                       | from top <i>for</i> rubeola <i>read</i> nitida.                                                                                    |
| „           | „                                                                        | from top <i>for</i> acutinscuta <i>read</i> acutinscula.                                                                           |
| 352         | 4                                                                        | from top Cyclotus Kalryenensis is a Cyathopoma like C. flocinctus and C. Malabaricus.                                              |
| „           | 11                                                                       | from bottom <i>for</i> globosa turbinata <i>read</i> globoso-turbinata.                                                            |
| „           | 9                                                                        | from bottom <i>for</i> accescentes <i>read</i> accrescentes.                                                                       |
| 354         | 11                                                                       | from top <i>for</i> bark <i>read</i> back.                                                                                         |
| „           | 15                                                                       | from bottom <i>for</i> aport <i>read</i> apert.                                                                                    |
| 355         | 6                                                                        | from top after medianis <i>read</i> circumdatus.                                                                                   |
| „           | 13                                                                       | from top <i>for</i> cogeners <i>read</i> congeners.                                                                                |
| 357         | 4                                                                        | from top <i>for</i> sucuriformis <i>read</i> securiformis.                                                                         |
| „           | 23                                                                       | from top <i>for</i> perpheriam <i>read</i> peripheriam.                                                                            |
| „           | 25                                                                       | from top <i>for</i> columellari breviter reflexo, marginibus remotis <i>read</i> marginibus remotis, columellari breviter reflexo. |
| 359         | 3, 8, 15 and 22 also p. 364 lines 7, 8, 18 and p. 366 line 5 from bottom | <i>for</i> Perotteti <i>read</i> Perrotteti.                                                                                       |
| „           | 14                                                                       | from bottom <i>for</i> superiori <i>read</i> superiores.                                                                           |
| „           | 13                                                                       | from bottom <i>for</i> inferiori <i>read</i> inferiores.                                                                           |
| „           | „                                                                        | from bottom <i>for</i> subplanati <i>read</i> subplanulati.                                                                        |
| „           | 12                                                                       | from bottom <i>for</i> subequans <i>read</i> subæquans.                                                                            |
| „           | 3                                                                        | from bottom <i>for</i> Pierrei <i>read</i> Pirriei.                                                                                |
| 360         | 7                                                                        | from top <i>for</i> lutia albida <i>read</i> luteo-albida.                                                                         |
| 361         | 9                                                                        | from top <i>for</i> obliquily <i>read</i> obliquely.                                                                               |
| 363         | 5                                                                        | from top <i>for</i> simicircularis <i>read</i> semicircularis.                                                                     |
| „           | 15                                                                       | from top <i>for</i> Nungumbankum <i>read</i> Nungumbaukum.                                                                         |
| „           | 8                                                                        | from bottom <i>for</i> Pteroryclos <i>read</i> Pterocyclos.                                                                        |
| 365         | 14                                                                       | from top <i>for</i> nilagrica <i>read</i> nilagarica.                                                                              |
| 366         | 13                                                                       | from top <i>for</i> Dipplommatina <i>read</i> Diplommatina.                                                                        |
| „           | 18                                                                       | from bottom <i>for</i> tricainata <i>read</i> tricarinata.                                                                         |
| „           | 10                                                                       | from bottom <i>after</i> Cyclotus <i>read</i> (Cyathopoma.)                                                                        |
| „           | 2                                                                        | from bottom <i>for</i> Eunea <i>read</i> Ennea.                                                                                    |

The above are the most important errata, several minor faults of misplaced punctuation, &c. occur, but they are obvious.

W. T. BLANFORD.

MEMORANDUM, *showing the final result of Archdeacon Pratt's calculations regarding the effect of Local Attraction upon the operations of the Great Trigonometrical Survey of India.*

*To the Secretary of the Asiatic Society of Bengal.*

DEAR SIR,—Having now received from London some copies of the last of my communications to the Royal Society on the amount of local attraction in India and its effect on the operations of the Trigonometrical Survey, I beg to present to the Asiatic Society a complete set of my papers on this subject bound up in one volume, and to request you to give insertion in your Journal to the following Memorandum, which gives a brief history of the circumstances connected with this investigation and of its final results.

I am, yours faithfully,

*Calcutta, April 30th, 1862.*

JOHN H. PRATT.

MEMORANDUM.

The influence of Mountain Attraction upon the position of the plumb-line and of the spirit-level in the operations of the Great Trigonometrical Survey of India was first pointed out to me by the Surveyor General in 1852, who on that occasion requested me to turn my attention to the subject. The result has been a series of papers which have been published in the Transactions of the Royal Society for 1854, 1855, 1858 and 1861. During the nine years over which the investigation has extended, new information has been obtained from time to time, and new suggestions have presented themselves to my mind. Some things which had been published in one paper have had to be modified in a subsequent one, and the object of this Memorandum is, now that the series is complete, to state what is the final result of the investigation.

2. I will give a brief historical sketch of the circumstances connected with the publication of the successive papers in the *Philosophical Transactions*.

The Surveyor General of India pointed out to me in 1852, that in the volume published by his predecessor Colonel Everest in 1847, giving an account of the measurement of the two northern portions of the Great Arc between Kaliana and Kalianpoor, and Kalianpoor and Damagida, lying in the longitude of Cape Comorin, the observed



or astronomical amplitudes\* were, the one  $5''.236$  less and the other  $3''.791$  greater than the calculated or geodetic amplitudes, the curvature of the Indian Arc being taken the same as that of the mean figure of the earth. This discrepancy was supposed to arise from local attraction,† deranging the position of the vertical determined by the plumb-line. This was a highly probable conjecture: but it required demonstration. The problem, then, which I set myself to solve was, To calculate by some direct method the actual amount of the attraction of the Himalayan mass, and of the deflection caused by it in the plumb-line. The result is shown in the FIRST PAPER of the series, *Phil. Trans.* 1854, p. 85, art. 43, (see also *Phil. Trans.* for 1858, p. 769, art. 22 of the Second Paper). The result therein obtained is very much larger than was expected or was required to explain the differences in the astronomical and geodetic amplitudes which Colonel Everest had detected. This calculation seemed, therefore, to increase the difficulty which it was intended to remove; as, in the course of the investigation, this new fact came out, that the disturbing effect of the Himalayas is far greater in amount than any one had ever anticipated, and also of far more extensive influence, as its amount in the centre of India is found to be greater than it was supposed to be even at Kaliaua only sixty miles from the hills.

To meet this new difficulty, Mr. Airy, the Astronomer Royal, suggested that there is probably a deficiency of matter immediately beneath the mountains, such as to counteract their effect upon stations in the plains. He assigns his reasons in a paper published in the same volume of the *Philosophical Transactions* and which I have introduced in this series for convenience of reference, (pp. 101—104) Objections to this hypothesis are given in the postscript to a paper I wrote on the English Arc in the volume for 1855, and which is also introduced on account of that postscript, (see p. 51).

\* For the benefit of non-Scientific readers I will mention that the *amplitude* of an arc of meridian is the difference of latitude of its extremities.

† If the earth were a perfect spheroid and its materials as we descend downwards were arranged in concentric spheroids, such as the mass would assume if it were fluid, then the total attraction of the earth's mass at any point of its surface would be perpendicular to the surface and the plumb-line would hang in that perpendicular. But if there were any superficial masses, such as mountains, or hollows, such as oceans, or any defect or excess of density in any parts of the earth's crust, a corresponding change would take place in the total amount and direction of the attraction. The resultant effect of these new and disturbing causes at any place is called the LOCAL ATTRACTION at that place.

Four years after this, following up Mr. Airy's suggestion, I proposed and reduced to calculation another hypothesis regarding deficiency of matter below the mountains; viz. that the irregularities of the mountain surface have arisen from the expansion upwards of the crust of the earth from depths below, which has upheaved the mountains and produced a slight but extensive attenuation of the mass below them. The result of this calculation is given in the SECOND PAPER of this series. I show that it is sufficient to produce a considerable amount of compensation for mountain attraction; but that it does not clear up the difficulties; and that as this attenuation is a mere hypothesis, nothing certain can be determined regarding it.

In this same paper it is shown that a very slight but wide-spread defect or excess of density in the materials of the crust of the earth is capable of producing a sensible and important effect on the plumb-line. Thus the possible and not improbable existence of an unknown cause of derangement of the plumb-line hitherto unthought of, as being hidden in the crust, was brought to light.

During the same year it occurred to me that there is another visible cause of disturbance besides the mountains which might produce a sensible effect, viz. the ocean, as its density is less than that of rock. In the THIRD PAPER this effect is calculated, and found to be of importance: (see *Phil. Trans.* for 1858, p. 790, art. 11). Thus a new source of error was detected.

3. Thus far, then, the attempt to clear up the discrepancies detected in the first instance by Colonel Everest between the astronomical and geodetical amplitudes had led to the discovery, that (1) the Himalayas attract places in the plains of India with a force far greater in amount than any person had conceived: And not only so, but that (2) the ocean also has an important influence of the same kind: And more than this, that (3) variations of density in the crust, which are as likely to exist as not, will produce the same effect.

The uncertainty, as to the form of the Himalayas and the depth of the ocean, produces a corresponding degree of uncertainty as to the exact amount of the attraction; while our utter ignorance regarding the condition of the crust below seemed to leave us in hopeless perplexity regarding the derangement which may proceed from that quarter. So that the attempt to determine the resultant amount of local attraction at stations on the Indian Arc by direct calculation would appear, for these reasons, altogether fruitless.



As noticed in these papers, I conceived also that the difference between the geodetic and astronomical amplitudes might arise, not solely from attraction influencing the plumb-line, but in part from the curvature of the Indian Arc being somewhat different from the curvature of the mean figure of the earth. Geology teaches us, that the earth's surface has undergone changes of level. The surface, therefore, cannot be now an exact spheroid. In this case the normals at the extremities of the actual arc would include an angle not precisely equal to the amplitude of the mean or undisturbed arc, and part of the errors to be accounted for might, it was thought, arise from this; the remainder arising from local attraction influencing the plumb-line, and therefore affecting the observed or astronomical amplitude. This served to introduce a new element of difficulty.

4. The ambiguity, however, with which the question was thus beset from all these causes is removed in the FOURTH PAPER, the last of the series, published in the *Philosophical Transactions* of 1861. The following theorem is there demonstrated:—That the length of the actual arc, altered as its form and position may be by geological changes, is nevertheless sensibly equal to the length of the mean or undisturbed arc. Hence, if we calculate the amplitude by using the measured length of the arc, and the *mean* axes, as is done in the Survey, it will come out the mean or undisturbed amplitude. The consequence of this is, that the relative position of places laid down on a map from geodetic operations is correct, and free from all sensible error arising from local attraction, from whatever causes local attraction may arise.

This is a most important practical result, and frees the Survey operations from a doubt which has attached to their high scientific accuracy, ever since it has been discovered that the influence of the Himalayas and of the ocean is so considerable, and that variations in the earth's crust below may have an important disturbing effect. This theorem, moreover, gives us a direct means of estimating at once the difference of local attractions, and of local deflections caused by them, at the extremities of an arc. For the difference is precisely equal to the quantity by which the astronomical amplitude differs from the mean or undisturbed amplitude found as above described.

5. There is only one desideratum remaining; but one which I

fear will never be met ; that is, To devise a method for determining the absolute latitude of some one place included in the map. The state of the question is, as I have said, at present *this* : the position of places determined by geodetic operations is correct and free from the effect of local attraction, *relatively* to the station from which the operations start. But how to find the latitude of this starting point, freed from the errors produced by local attraction, is a problem unsolved, and unlikely to be solved. Even if any spot exists which is altogether free from local attraction, that is where all such influences nullify each other, it is impossible to discover it and to assure ourselves of the fact.

6. Thus geodesy can give us accurate maps of the relative position of places ; but cannot, with the same accuracy, assign the position of the maps on the terrestrial spheroid. Suppose, to take a comprehensive case, that the whole globe were surveyed and all places in it connected by triangulation with the spot in the north where the plumb-line points to the north-pole in the heavens. The positions of all places would be found free from error relatively to this spot—which is commonly called the North Pole of the earth. But how can we be sure that the plumb-line at that spot is hanging in the true vertical ? It may be under the influence of local attraction : in which case, although it points to the pole in the heavens, the spot in question will not be the pole on the earth. There is no means, nor can I conceive any means possible, short of ascertaining all the disturbing causes throughout the earth's mass and calculating their effects, of determining whether the plumb-line *is* or *is not* at the true pole. The accurate position, therefore, of our maps on the terrestrial spheroid which depends upon this question is alike unknown and uncertain. This is the point to which the investigation is brought, and where, I have no doubt, it will stop. It is satisfactory that the mapping of a country may be laid down, free from all error as to the relative situation of places : also that the relative amount of local attraction, comparing one place with another, can be determined, because this may assist in ascertaining the structure of the crust below. It would, however, be still more satisfactory if this one remaining difficulty could be removed, as it would make the data more complete for the high scientific determination of the Figure of the Earth.



*A Memoir on the living Asiatic species of Rhinoceros.*—By  
EDWARD BLYTH.

Among the investigations to which I devoted particular attention during my late rambles in Burmá, was the endeavour to corroborate and *confirm* the statement of Helfer and others, that the three known Asiatic species of Rhinoceros inhabited that region. In this I succeeded, so far as the two insular species (*viz.* the one-horned RH. SONDAICUS and the two-horned RH. SUMATRANUS) are concerned; for these prove to be the ordinary Rhinoceroses of the Indo-Chinese region and continuous Malayan peninsula; and I have reason now to believe that they are the only Rhinoceroses of that great range of territory; the huge RH. INDICUS (so far as I can discover) appearing to be peculiar to the *tarai* region at the foot of the Himálayas and valley of the Bráhma-putra (or province of Asám); the Rhinoceros still common in the eastern Sundarbáns, and also of the Rájmáhal hills in Bengal (where fast verging on extirpation), being identical with that of Jáva and Borneo, in the great oriental archipelago; while the Asiatic two-horned species (RH. SUMATRANUS) appears to be more common than the lesser one-horned (RH. SONDAICUS) in the Indo-Chinese territories,—this animal extending northward to the Ya-ma-doung range of mountains which separates Arakan from Pegu, where Col. Yule observed it as high as the latitude of Ramri island, and I have been assured by Major Ripley that one was killed not long ago in the vicinity of Sandoway. What the particular species may have been that was hunted by the Mogul Emperor Báber on the banks of the Indus cannot now be ascertained; unless, indeed, some bones of it may yet be recovered from the alluvium of that river. It is remarkable that he compares its bowels to those of a Horse! A species is also stated by Duhalde to inhabit the province of Quang-si in China, in lat. 15°. This is much more likely to prove either RH. SONDAICUS or RH. SUMATRANUS, than the large RH. INDICUS.

It is true that the late Dr. Theodore Cantor, in his 'Catalogue of the mammalia of the Malayan peninsula' (*J. A. S.* XV, 263), asserts that both RH. INDICUS and RH. SONDAICUS "seem to be numerous" there; but he does not mention that he had examined specimens;

and he moreover notices that “a two-horned Rhinoceros is stated by the Malays to inhabit, but rarely to leave, the densest jungle.” As this animal is common in parts of Burmá, as well as in Sumátra, it may be confidently predicated to inhabit the intervening region of the Malayan peninsula: but the more common and ordinary species of the peninsula would appear to be *RH. SONDAICUS*; and a friend who has killed as many as nine individuals in the southern half of that region, to whom I shewed several skulls of *INDICUS* and of *SONDAICUS*, is positive that all which he saw there were of the lesser one-horned species, as distinguished from the larger. The former, as before remarked, inhabits the islands of Jáva and Borneo in the archipelago, but not Sumátra;\* whereas the two-horned species, as an insular animal, appears to be peculiar to Sumátra.† In the volume on Elephants, &c. in Sir W. Jardine’s ‘Naturalist’s Library,’ the lesser one-horned Rhinoceros is erroneously styled “the one-horned Sumátran Rhinoceros;” a mistake which might have been rectified by reference to Sir T. St. Raffles’s paper in the 13th Vol. of the ‘Transactions of the Linnæan Society,’ which indeed is cited by the compiler.‡

The vernacular topical names of *Jávan* and *Sumátran* Rhinocéroses had now better be disused; seeing that both species have an extensive range of distribution on the mainland of S. E. Asia; the latter should rather be denominated ‘the Asiatic two-horned Rhinoceros;’ and the two others ‘the Great one-horned’ and the ‘Lesser one-horned;’ unless, indeed, the alleged discovery should be confirmed of the existence of a one-horned species in inter-tropical Africa, in addition to the four two-horned species which are now recognised

\* The range of *BOS SONDAICUS* is similar; excepting that this animal does not extend to Bengal, like *RHINOCEROS SONDAICUS*.

† As also the Malayan Tapir, the continental range of which extends northward to the Tenasserim provinces of Tavoy and Mergui.

‡ The adult male Rhinoceros which lived for many years in the gardens of the Zoological Society, Regent’s Park, London, (and for which the considerable sum of £1000 was paid,) is stated to have been captured in Arakan; but he was not nearly so large as several that I have since seen in India; and, therefore, I entertain an exceedingly strong suspicion that he was no other than *SONDAICUS*. His bones have doubtless been preserved. The two Asiatic one-horned species, indeed, resemble each other a great deal more nearly, in external appearance, than the published figures of them would lead to suppose. Certainly no sportsman or ordinary observer would distinguish them apart, unless his attention had been specially called to the subject. The best figure I know of adult *RH. INDICUS* is that published by Cuvier and Geoffroy, in the *Menagerie du Museum d’Hist. Nat.*



upon that continent (in which case the 'Great Indian' and the 'Lesser Indian' might be deemed sufficiently appropriate; as the range of the 'Asiatic two-horned' does not extend to India proper, which of course comprises Bengal but not Burmá). The existence of an African one-horned Rhinoceros was long ago affirmed by James Bruce of Kinnaird, in addition to the two-horned species which he pretended to figure;\* and Sir Andrew Smith assured me that he had been repeatedly told by natives that such an animal occurred in the regions northward of the tropic of Capricorn. In the *Comptes Rendus*, tom. XXVI (1848), p. 281, an elaborate letter is published 'Sur l'existence d'une espèce Unicorne de Rhinocéros dans la partie tropicale de l'Afrique,' from Mons. F. Fresnel, then Consul of France at Jidda ('Djedda'), to which the reader, curious on the subject, is referred.

\* Bruce's figure of the Abyssinian Rhinoceros, it is well known, is a reversed copy of Buffon's representation of true RH. INDICUS, with a second horn added.—Dr. Rüppell ascertained the species to be RH. AFRICANUS, the ordinary 'Black Rhinoceros' of S. Africa. The earliest-published *genuine* figure of this animal is that in the Supplement to Buffon's work; but certainly the most spirited as well as correct pictorial representations, alike of the Rhinoceroses and of various other animals of Africa, are given by modern sporting travellers, as Cornwallis Harris, and especially C. J. Andersson. By a slip of the pen, the latter writer alludes to Rhinoceroses in the island of Ceylon! As even Humboldt referred to the Tiger of Ceylon in his *Asie Centrale*!

There are capital figures of some of the arctic animals, also, in Mr. J. Lamont's 'Seasons with the Sea Horses' (1861); among the rest, of the Spitzbergen Deer, represented with well-developed vertical brow-plates to their horns (*vide J. A. S.* XXIX, 376). The question about the development of these Deer, as compared with those of Lapland, (mooted *loc. cit.*, p. 382,) is elucidated by Mr. Lamont, who states that—"They do not grow to such a large size as the tame Rein Deer of Lapland, nor are their horns quite so fine; but, they attain to a most extraordinary degree of condition. For further details, *vide* his extremely interesting volume. However, I may remark that in all his figures of Rein Deer the brow-plate is represented as being well-developed upon each horn; whereas I suspect that it is, generally, only rudimentary upon one of the pair; this, however, is probably a mistake on the part of the lithographer!

In further reference to the article alluded to, in which I commented upon the late Professor Isidore St. Hilaire's remarks upon domestic animals, and contended that we do not owe the domestication of the Turkey to the Spanish invaders of America, (a most unlikely people to have accomplished anything of the kind,) I may remark, that so completely familiar had this fowl become in Shakspeare's time, that its then almost recent introduction into Europe had already been forgotten; for the great bard of Avon considerably ante-dates the existence of Turkeys in England, making it prior to the Spanish discovery of the New World! In the first part of the drama of King Henry IV, Act II, Sc. 1, one of the carriers introduced exclaims—"Odsbody! The turkeys in my panniers are quite starved." But it is not impossible that Shakspeare meant the Guinea-fowl; albeit not very probable: though, in either case, he had ante-dated the appearance of the domestic bird in European countries.

Professor Schinz, in his *Synopsis Mammalium* (1845), makes out as many as eight living species of Rhinoceros. The two Asiatic one-horned species, of course; and SONDAICUS only from Jáva: SUMATRANUS from Sumátra only; and of this he remarks—"Cornu anterius mediocre, posterius minutum" (not having seen Bell's outline of the horns of the male, in the *Phil. Trans.* for 1793, to be noticed presently). His *Rh. niger* and his *Rh. Camperi* must alike be referred to RH. AFRICANUS (seu *capensis*). Next, RH. SIMUS and RH. KEITLOA; but, of course, neither RH. OSWELLII nor RH. CROSSII. But what is his *Rh. cucullatus*, Wagler (Schreber's *Supp.*, tab. CCCXVII,—F. Schinz, *Monagr.*, t. 4)? Unless an ill-stuffed RH. SUMATRANUS! "*Rh. cornubus duobus, capite sensim elevato, plicis cutis profundis* [!], *clypeo scapulari indiviso, supra latiori, epidermide verrucis parvis obsita. Capite elongato, auriculis subcylindricis, labro elongato prehensili, cauda mediocri. Long. corporis 6, 11", caudæ 1' 7". Altitudo stethiae 3' 4 $\frac{1}{3}$ ", uraei 3' 4 $\frac{1}{2}$ ". Habitat — ? Hospitatur in museo Monacensi."*

From examination of an extensive series of skulls of Asiatic Rhinoceroses, it is impossible not to discern that there are three well marked species, each of which varies considerably in the shape of the cranium. Of each there is a shorter and broader type, higher at the occiput, wider anterior to the orbits; and also a type the opposite of this, with every intermediate gradation. This amount of variation in the existing Asiatic species of the genus should intimate caution in the acceptance of *all* of the very numerous fossil forms that have been named by palæontologists.

The RH. SONDAICUS and RH. SUMATRANUS are very inadequately represented by the figures of skulls published by Cuvier and de Blainville. Those of both authors represent the narrow type, as distinguished from the broad type; whereas their figures of the skull of RH. INDICUS (seu *unicornis*, L.) represent an unusually fine broad example of the species (doubtless the skull of the individual figured from life in the *Menagerie du Museum d'Hist. Nat.*); which gives a far greater amount of contrast of appearance to the skulls of INDICUS and SONDAICUS, than exists in average specimens of those of the two species.

The skulls of INDICUS and SONDAICUS appear to differ only, *constantly*, in the former being considerably larger, and having the con-



dyle of the lower jaw (proportionally) much more elevated; imparting a conspicuously greater altitude to the vertex when the lower jaw is *in situ*. Both species would appear to exhibit precisely the same amount of variation. On present evidence (which, however, I suspect to be fallacious), it would seem that the broader type of *SONDAICUS* prevails in Bengal, and perhaps the narrower far southward; but we have both from the Tenasserim provinces; and they completely grade into each other, as equally in the analogous instances of *INDICUS* and *SUMATRANUS*.

In illustration of the skulls, I cite the figures of Cuvier and de Blainville (*Oss. Foss., Atlas*, pl. 42, f. 1, pl. 160, f. 1,—*Osteographie, Rhinoceros*, pl. 2), as exemplifying the broad-faced type of *RH. INDICUS*; and a very similar skull is that upon the skeleton of a *female* in the museum of the Calcutta Medical College. This female is one of a pair that lived about 45 years in captivity in Barrackpore park. I have repeatedly seen the pair when alive, many years ago; and remarked that they shewed no *secondary* sexual diversity, being exactly of the same size and general appearance. They never bred; and I have been informed that a pair of Tapirs similarly kept, for many years, in Batavia, shewed no disposition to propagate their species. They should, of course, have been separated for a time now and then, and again put together. We learn, from this Calcutta Medical College specimen and others, that the two forms of skull presented by the Asiatic species of Rhinoceros are not indicative of sex, as might probably have been suspected.

I now figure (pl. I, fig. 1, and pl. II, fig. 1,) a very fine example of the narrow type of skull of *RHINOCEROS INDICUS*; a splendid adult male, with its horn. Let this be compared and contrasted with the figures of the broad-faced type of skull published by Cuvier and de Blainville. The skull now represented belongs to Capt. Fortescue, of the late 73rd Regiment of Bengal Native Infantry; who killed the animal on the Butan side of the river Tista, not far from Jálpigári. He has taken it to England. Two specimens in the Calcutta Medical College museum are very similar; a third is intermediate, though decidedly rather broad than otherwise; and a fourth (that already noticed, with complete skeleton, *female*, as before specified,) very closely approximates—even to minute details—the superb broad skull figured by the eminent French zoologists. Five examples, in all, under

examination, besides the figures referred to. Strange to say, we do not yet possess a single 'spoil' of this species in the museum of the Society! But I trust and have reason to believe that this singular *hiatus* in our series will speedily become a record of the past.

Plate I, fig. 2, represents the broad type of skull of RH. SONDAICUS, from the Bengal Sundarbáns; and pl. II, f. 2, the same from the Tenasserim provinces. Pl. I, f. 3, and pl. II, f. 3, represent an aged specimen of the narrow type of SONDAICUS, from *Jáva*. We have Tenasserim examples quite similar, except that they are not so aged; but I figure the Jávanesé one, that there should be no misapprehension about the identification of the species. I have already remarked that these comparatively broad and narrow types completely grade into each other, as likewise in the preceding species. It is simply impossible to trace a dividing line in the instance of either one of the three.

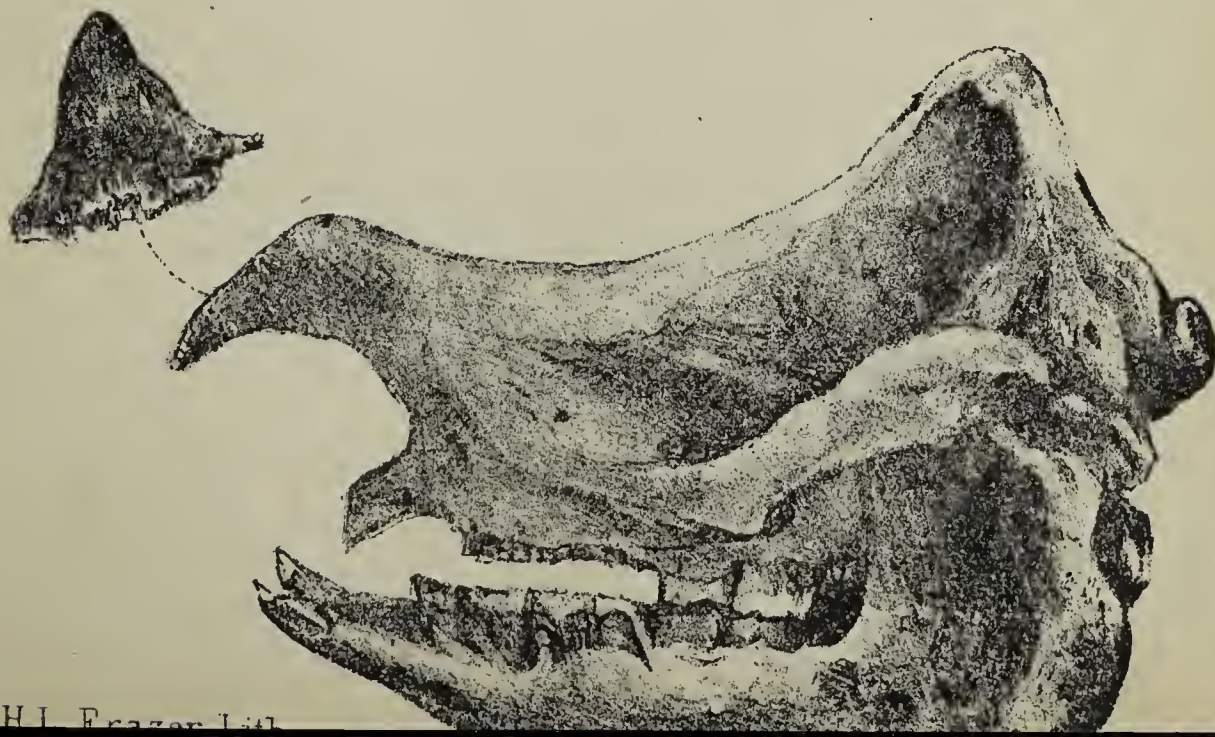
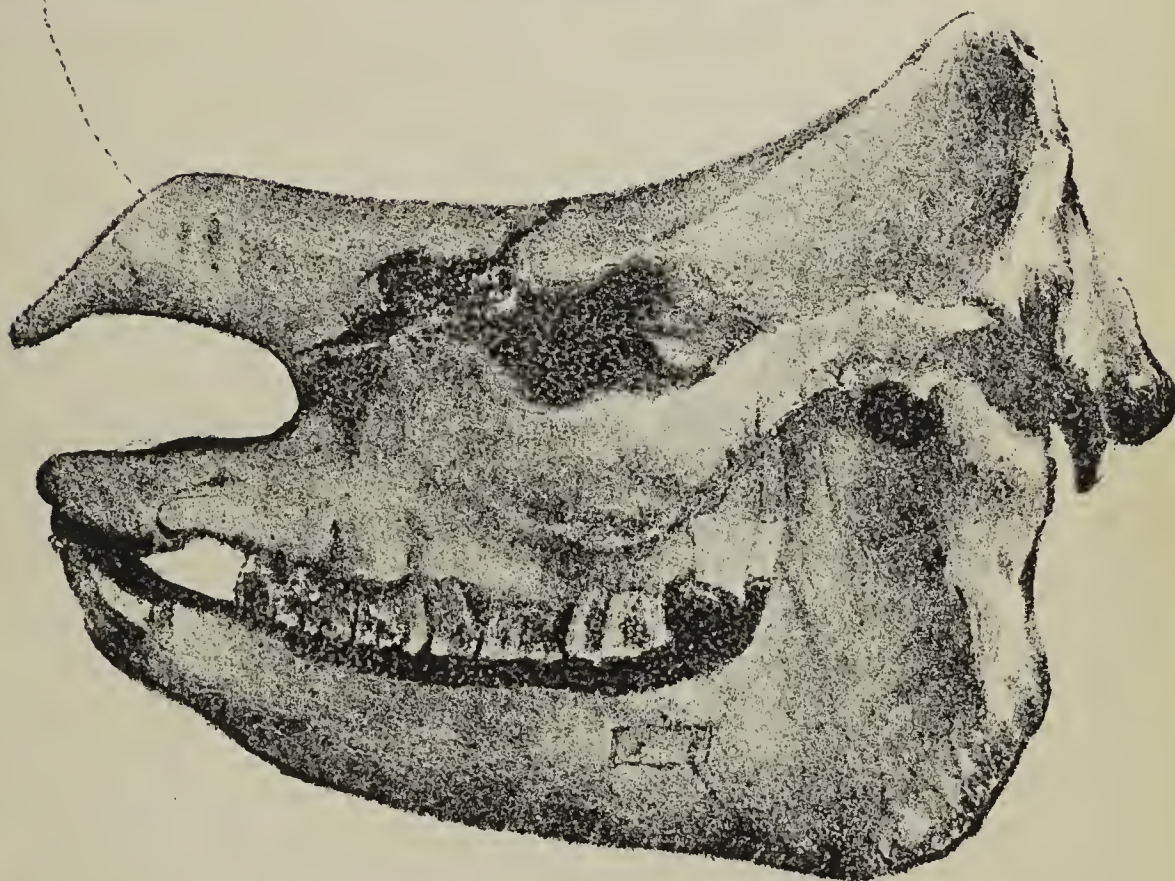
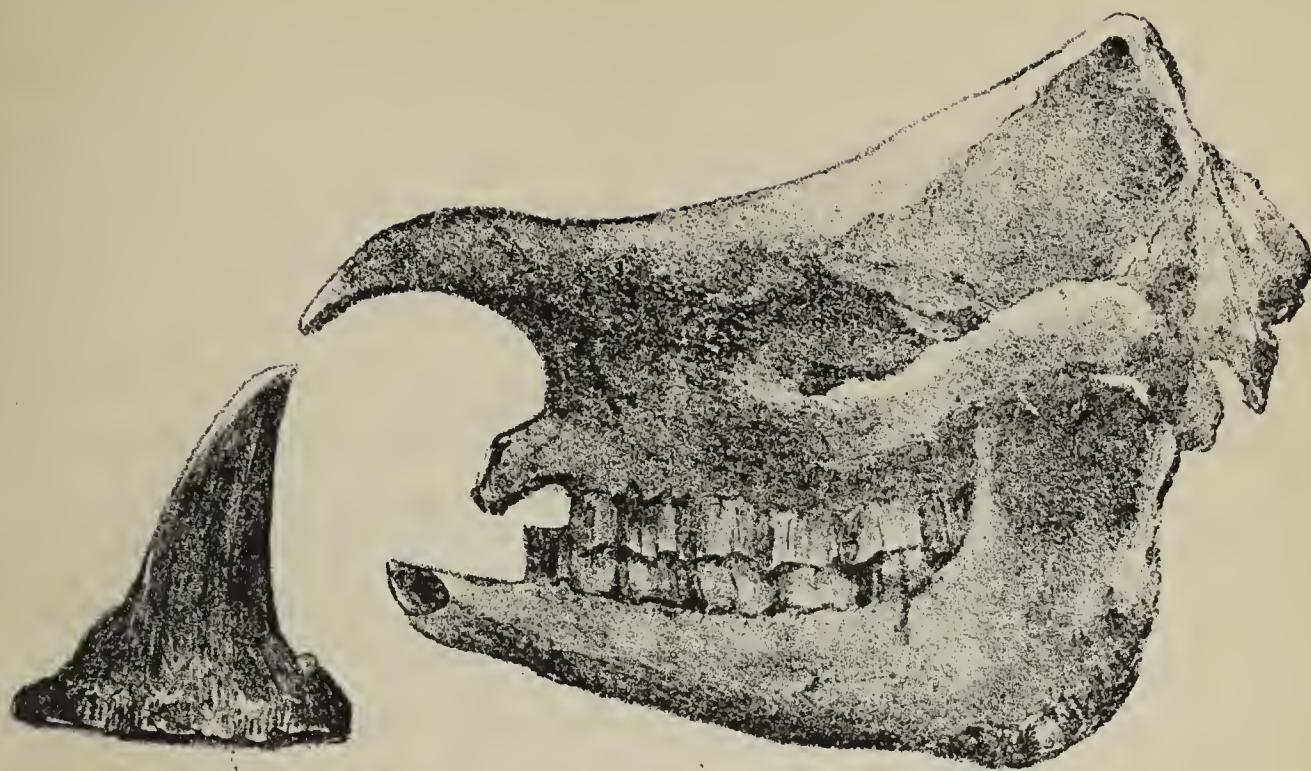
Plate III, fs. 1, 2, represent the corresponding types of males of the two-horned RH. SUMATRANUS; f. 3, of a female, of which the stuffed skin of the head is also in the Society's museum. All are from the Tenasserim provinces.

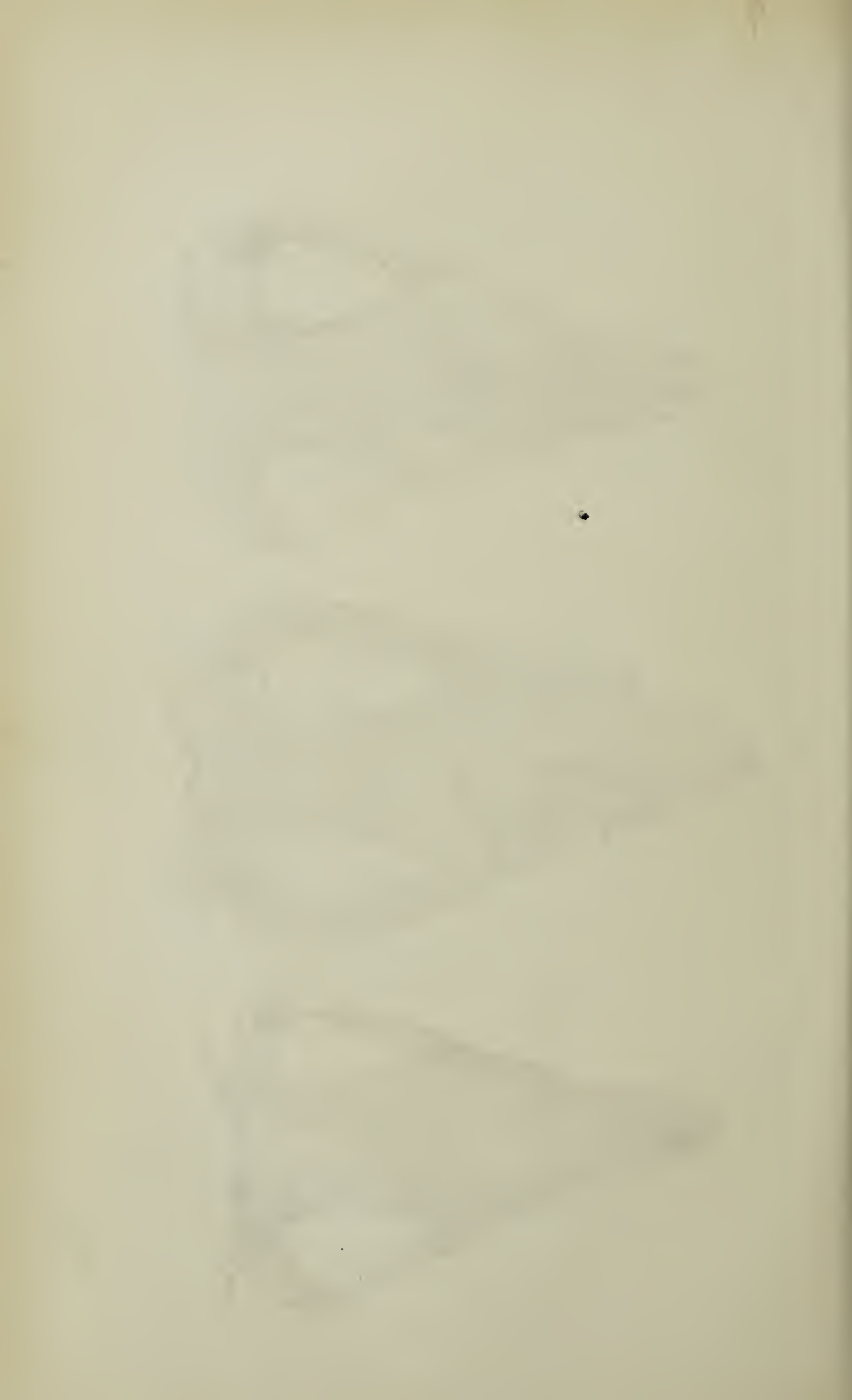
Plate IV, f. 1, is from a drawing which I took of a beautiful specimen in the possession of Lt.-Col. Fytche, Commissioner of the Martaban and Tenasserim provinces, at Moulmein.\* The animal was killed in Tavoy province, near the frontier of Siam. When I first saw this specimen, the horns were attached to the skin; and they now *fit* to the rugosities of the bony surface. The resemblance of the anterior horn (more especially) to the extraordinarily fine horn figured as that of a new species, RH. CROSSII, Gray (in the *Proc. Zool. Soc.* 1845, p. 250, and copied in pl. IV, f. 4), induced me to conjecture that the latter was merely a magnificently developed specimen of the anterior horn of RH. SUMATRANUS; but the difference of size (that of RH. CROSSII measuring 2 ft. in span of curvature from base to tip) seems to be too great. Of the near affinity, however, there can be no doubt; and it is just such a horn as the nearly akin (however huge) RH. PLATYRHINUS of Cautley and Falconer, from the Siwálik deposits, might have borne.† Other kindred fossil species

\* The horns, as represented in the lithograph, are not sufficiently massive.

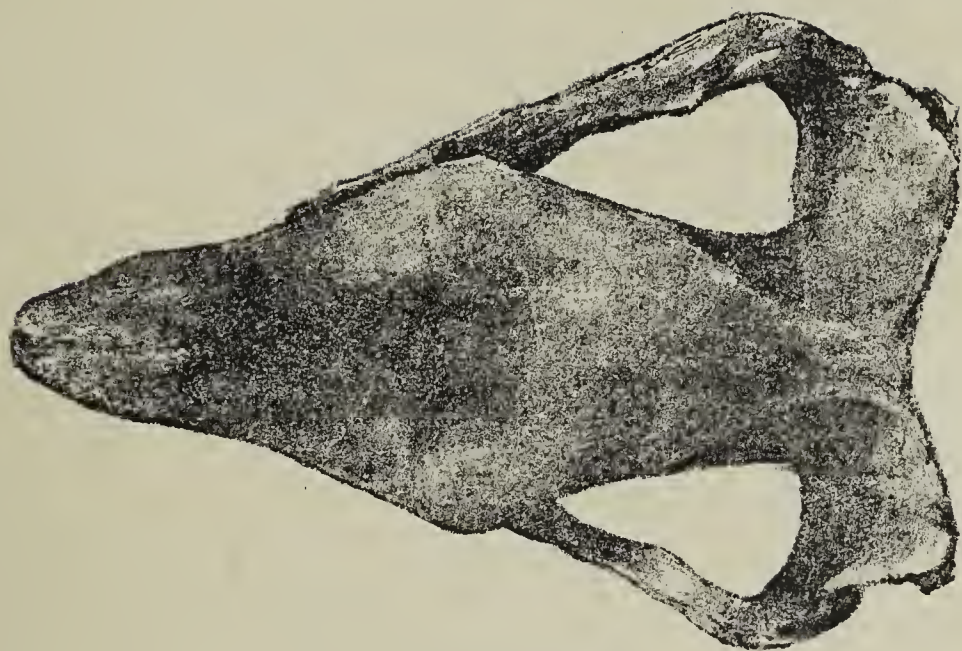
† In a letter just received from Col. Fytche, who had recently returned from a tour in the southern Tenasserim provinces, that officer writes—"I came across



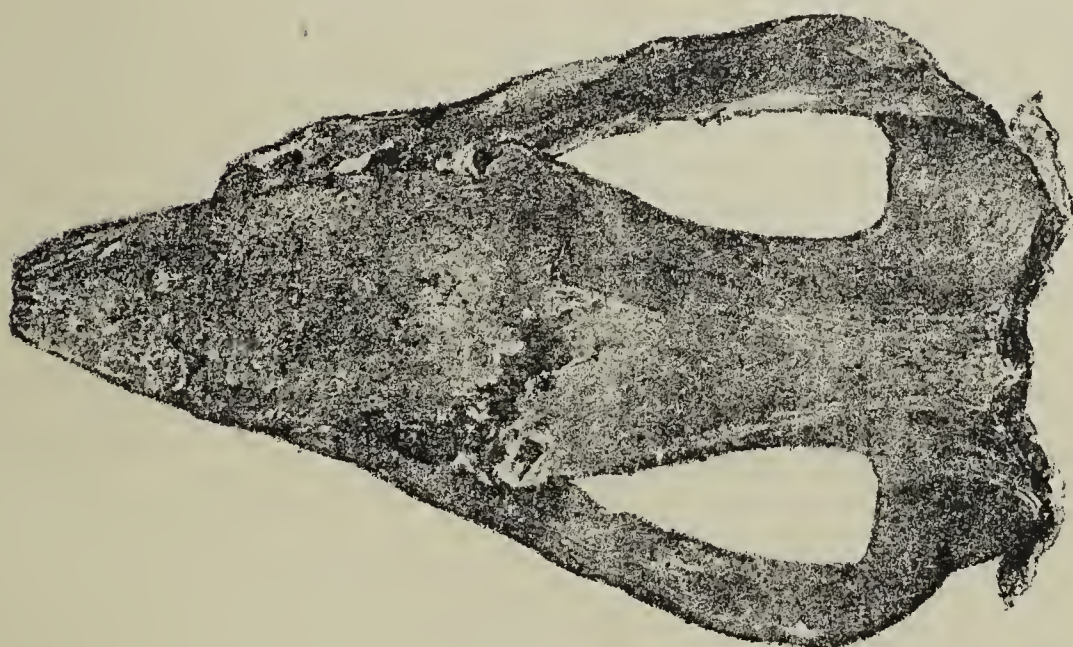




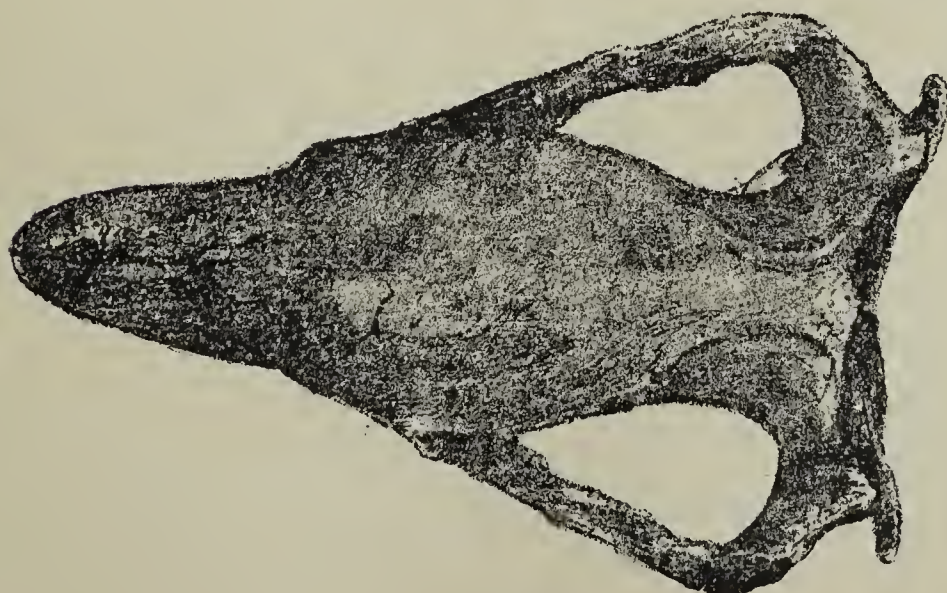




*f. 2.*



*f. 1.*



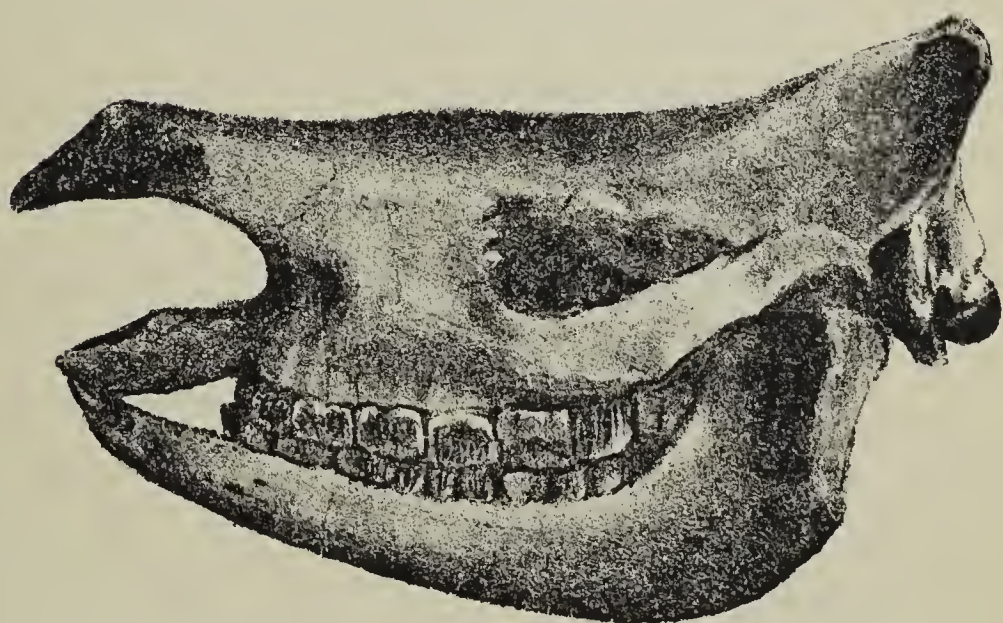
*f. 3.*



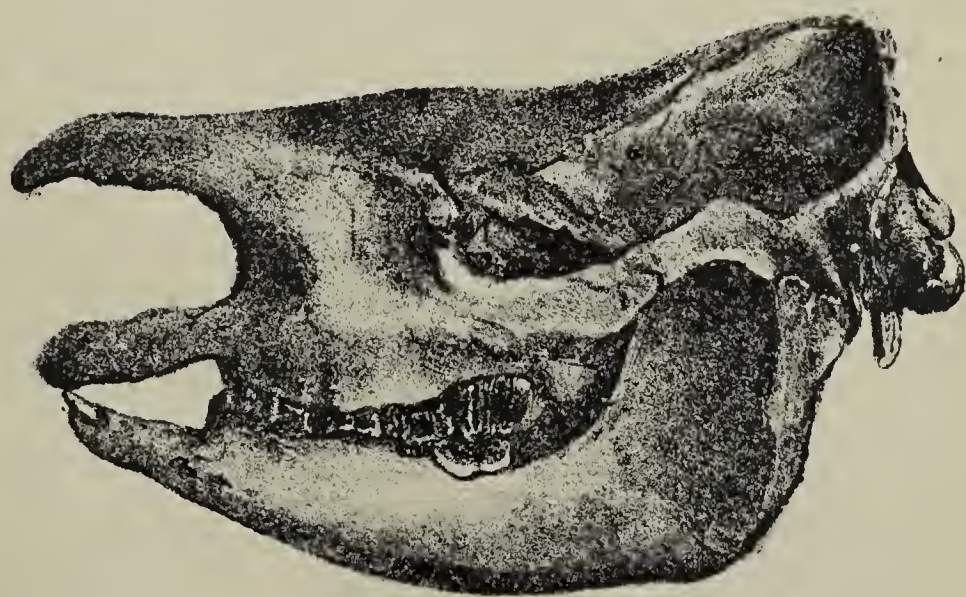




f. 1.



f. 2.



f. 3.



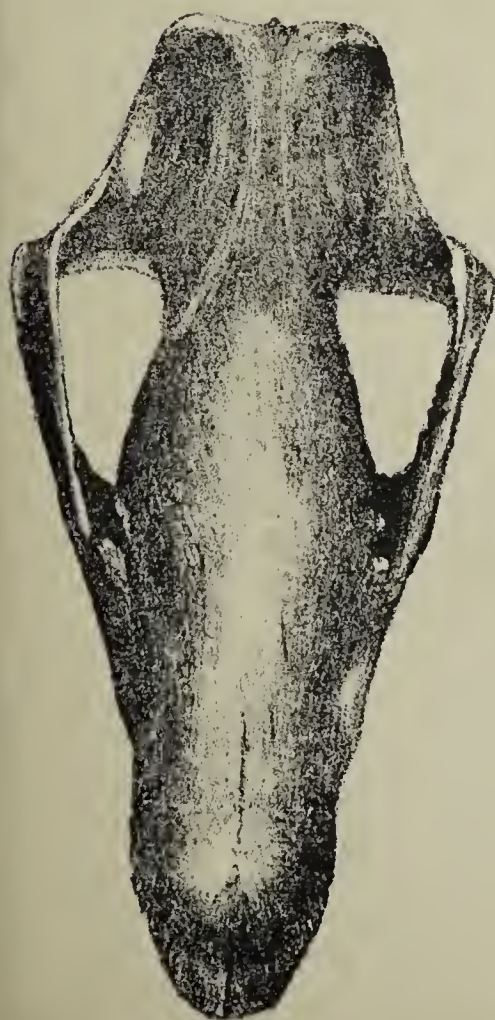




f. 4.



f. 1.



f. 3.



f. 2.





are (or were) the RH. LEPTORHINUS of the later European tertiar-ies, apparently also the RH. SCHLEIERMACHERI (v. *megarhinus*), and I cannot help thinking even the immense RH. TICHORHINUS,—all of these exemplifying an Eurasian or Europæo-asiatic (and more or less hair-clad) type of two-horned Rhinoceros, as distinguished from the existing two-horned African type, which is represented by as many as four living species (falling under two groups, with prehensile and non-prehensile upper lip, and browsing or grazing habits accordingly,—those of the latter habit being more gregarious and also more gentle in disposition\*). Figs. 3 and 4 of plate IV, represent the front view of the skulls fs. 2 and 3 of pl. III; but I have reason to suspect that the united nasal bones of f. 4 of plate IV, are rarely so narrow in the female of RH. SUMATRANUS, as in the example represented.

With the exceptions of fs. 1 and 4 of pl. IV, all the representations given were photographed together in one focus, so that the relative sizes are quite accurately rendered. The scale of all is  $1\frac{1}{2}$  in. to 1 ft.†

So far as I can learn, the RH. SUMATRANUS is the only existing species of Rhinoceros which presents secondary sexual distinctions; inasmuch as the horns of the male are very considerably more deve-

three Rhinoceroses down to the southward, but was unsuccessful. One, the monarch of the forest, I tracked up a mountain some 4,000 ft. high, which took me six hours to get up; and close on the top, he rose up before me within six feet, a magnificent beast. He was sideways towards me, and I distinctly saw his two horns, which were at least ten to twelve inches longer than those I have got. He would have been a great prize; but, unfortunately, I had not my rifle in my hand at the time, and the man who was carrying it fell down on his face in a fright, and rolled down the hill. The beast was certainly a rather startling apparition; his advent being so very sudden, as if he had come up through a trap-door in a pantomime, giving a tremendous roar, something between that of an Elephant and that of a wild Boar."

\* For figures of the heads of these animals, in a collated group, *vide* Mr. C. J. Andersson's 'Lake Ngami,' 2nd edit., p. 986. The affinity of the extinct European species with RH. SUMATRANUS has been long ago remarked by Cuvier and Owen. The Siwálik RH. PLATYRHINUS of Cantley and Falconer is just RH. SUMATRANUS enormously magnified; and the RH. SIVALENSIS of the same naturalists comes exceedingly close to the existing INDICUS (with the narrow form of skull, and their RH. PALÆINDICUS to the same with broad form of skull). Can it be the identical species which has lived down to the present time? The discrepancy is, at least, not greater than subsists between BISON PRISCUS and the modern *Zubr*, which are considered by Owen to be one and the same.

Since writing the above, I have read Prof. Owen's memoir 'On a National Museum of Natural History.' Even he, evidently, had no idea of the two insular species of Rhinoceros extending their range to the mainland, as appears from his casual notice of them.

† For these and other photographs of objects of Natural History, I have to thank my esteemed friend T. S. Isaac, Esq., C. E.

loped than those of the female. It further differs from the four existing African species of two-horned Rhinoceros, not only by possessing slight skin-folds, but also by having the bases of the horns separated by a considerable interval: Bell's figure (in the 'Philosophical Transactions' for 1793) represents, as I believe, their full development in an adult female; as shewn likewise in a (Tenasserim) stuffed head in the Society's museum, already referred to: and over Bell's figure of the skull of a male are represented in outline the horns of an ordinary male; not quite so fine, however, as those upon Col. Fytche's specimen; and that officer informs me that he has possessed a head with still finer horns, some five or six inches longer. Unfortunately, fine horns of *RH. SUMATRANUS* are exceedingly difficult to procure; as they are eagerly bought up at high prices by the China-men, who not only value them as medicines, but carve them into very elegant ornaments.\* Still the horns which Dr. Salomon Müller figures, upon what he calls an adult male, are small; and when I was at Pahpoon, amid the forests of the Yunzalin district of Upper Martaban, in November last, an animal of this species was killed within five miles of me; but I did not learn of this in time, and was only able to procure the facial bones with the two horns. From their size and appearance I took them to be the horns of rather a juvenile male; but, on cleaning the bone, the nasals were found to be most completely and solidly anchylosed and united, and of the usual width in the male sex. The Karens obtained the animal by means of a heavy falling-stake, such as they set for Tigers and other large game;† and the carcase was completely hacked to pieces by them, and every edible portion of it devoured.

The Rev. Dr. Mason remarks, in his work on 'The Natural Productions of Burmah' (1850), that the hide of the two-horned Rhinoceros of that region is "smooth like a Buffalo's." This expression might mislead into the suspicion that the species is not exactly the same as that of Sumátra. Col. Fytche writes word, on this subject,

\* The anterior horn of Col. Fytche's specimen is worth (I was told) about fifty rupees, or £5.

I have seen a pair beautifully carved and polished, and set with the bases upward, in a black wooden frame similar to the stands on which Chinese metallic mirrors are mounted; and am sure now that they were the two horns of one individual of *RH. SUMATRANUS*, of about the same development as those upon Col. Fytche's specimen.

† *Vide* Andersson's 'Lake Ngami,' 2nd edit., p. 258.



—“ I have, myself, shot three Rhinoceroses ; one single-horned, on the borders of Asám [INDICUS, of course] ; and the other two, not far from Bassein in the Yomatoung range separating Pegu from Arakan. I saw the skin of the one whose skull you have got [that of RH. SONDAICUS (of the narrow type), shot by my friend Dr. Hook of Tavoy near Tavoy Point, where there is a small isolated colony of the species], and it was exactly, in every respect, like the one I shot in Asám. The two-horned fellows I shot had smooth skins, as stated by Mason ; they were, however, very thick, and there were slight rumpled or folds about the neck and shoulders, I remember, but nothing to be compared in size to the mailed armour of the single-horned species.” In Burmá, people distinguish only a one-horned kind and a two-horned kind ; and though the skull from Tavoy Point, referred to, is very nearly adult and of fair size, Col. Fytche thought it to be that of a small and immature animal, as compared with the huge INDICUS that he killed in Asám. I must frankly confess that I have only quite recently discriminated the two one-horned species ; fancying, as a matter of course, that the numerous skulls of single-horned Rhinoceroses in the Society’s museum, from the Bengal Sundarbáns, &c., especially of the broad-faced type, were necessarily of the hitherto reputed sole Indian species. F. Cuvier’s figure of RH. SONDAICUS is that of a very young animal ; and, with those of Horsfield and S. Müller, conveys the appearance of a more evenly *tessellated* hide than I remember to have seen in any living continental example. I have, however, been comparing our stuffed Sundarbán example (less than half-grown) with the figure of adult RH. INDICUS in the *Menagerie du Museum d’Hist. Nat.*, and with the figures of RH. SONDAICUS by S. Müller and others ; and perceive that it must be referred to the latter and not to the former. The tubercles of the hide *are* much smaller than in INDICUS ; and a marked difference between the two species, as represented, consists in the great skin-fold *at the setting on of the head* of INDICUS, which is at most but indicated in SONDAICUS. In skulls of adults, however those of both species may vary in width, and especially in breadth anterior to the orbits, the following distinctions are *trenchant*. Length of skull, from middle of occiput to tip of united nasals (measured by callipers),—in INDICUS 2 ft. ( $\frac{1}{2}$  in. more or less),—in SONDAICUS,  $1\frac{3}{4}$  ft. at most. Height of condyle of lower jaw,—in

INDICUS 1 ft. (or even a trifle more),—in SONDALICUS 9 in. Breadth of bony interspace between the tusks of the lower jaw,—in INDICUS  $1\frac{1}{2}$  to  $1\frac{3}{4}$  in.,—in SONDALICUS  $\frac{3}{4}$  to 1 in. These measurements are taken from exceedingly fine examples of both species.

Sir T. Stamford Raffles asserts, of RH. SUMATRANUS, that “the female has a larger and heavier head than the male, but is similar in other respects.” (!) This decidedly does not apply to the two-horned species inhabiting Burmá; nor even to Bell’s figures of *Sumatran* individuals! Raffles further remarks that—“Dr. Bell’s description and representation of this animal are extremely correct. The skin of the Sumatran Rhinoceros,” he adds, “is much softer and more flexible than that of the Indian one, and is not, like it, corrugated into plates of mail. It has, however, some doublings or folds, particularly about the neck, shoulders, and haunches, rather more distinct and defined than in Dr. Bell’s drawing. The natives assert that a third horn is sometimes met with; and in one of the young specimens procured, an indication of the kind was observed.” (*Lin. Tr.* XIII, 268.) In Mr. C. J. Andersson’s ‘Lake Ngami’ (2nd edit., p. 263), the same is remarked of one or more of the ordinarily two-horned Rhinoceroses of Africa. This traveller writes—“I have met persons who told me that they had killed Rhinoceroses with three horns; but in all such cases (and they have been but few) the third or hindmost horn is so small as to be scarcely perceptible.” This seems a not unlikely character to have been developed more frequently in the great fossil RH. TICHORHINUS of N. Europe and Asia.

Bell further mentions, of RH. SUMATRANUS, that—“The whole skin of the animal is rough, and covered very thinly with short black hair.” The latter is conspicuously represented in F. Cuvier’s portrait of the species in the *Planches des Mammifères*, less so in Bell’s figure in the *Phil. Trans.*, and in that by Dr. Salomon Müller; and it is well shewn about the *jowl* and base of the lower jaw of our stuffed skin of the head of an adult female. In Dr. S. Müller’s figure of what he styles an adult male (but the horns of which are quite small, as in the adult Martaban example before noticed\*), the shoulder-plait is rather more strongly developed, especially towards

\* Can these animals, under any circumstances, occasionally shed and renew their horns, which consist only of a mass of agglutinated hair? There is certainly no physiological objection to the possibility of their doing so.



the elbow, than in the figures published by Bell and F. Cuvier,—F. Cuvier's figure representing a young male, and that by Bell a mature female, while the skull represented by Bell is that of a male with finer horns than appear to have been hitherto represented elsewhere. The figure in the 'Naturalist's Library' (*Elephants, &c.*, pl. XI,) is an exaggerated and very incorrect copy of that by F. Cuvier, with the skin-folds greatly too much developed.

Sir T. St. Raffles further remarks, of the Asiatic two-horned Rhinoceros (in Sumátra), that—"They are not bold, and one of the largest size has been seen to run away from a single Wild Dog." We hear, however, of a "fire-eating Rhinoceros" in Burmá, from its habit of attacking the night-fires of travellers, and scattering the burning embers and doing other mischief, being attracted by unusual noises instead of fleeing from them as most wild animals do. Prof. Oldham's camp was attacked in this way, in Tavoy province; and the animal being mortally wounded by a 2 oz.-ball, its skull was recovered three days afterwards, and proved to be that of SUMATRA-NUS. The same propensity is ascribed to the ordinary black Rhinoceros of S. Africa (RH. AFRICANUS). Thus Dr. Mason cites—"This animal appears to be excited by the glow of a fire, towards which it rushes with fury, overcoming every obstacle. It has been known to rush with such rapidity upon a military party lodged among the bush covering the banks of the Great Fish river, that, before the men could be aroused, it had severely injured two of them, tossed about and broken several guns, and completely scattered the burning wood." I am not aware that the same ferocity has been remarked of either of the mailed one-horned species.

In Java, the RH. SONDAICUS is reputed to be rather a mild animal; though I could cite a rumour of one attacking a sailor's watering party. (*Zoologist*, p. 7328.) According to Professor Reinhardt, this animal is (in Jáva) "found everywhere in the most elevated regions, and ascending, with an astonishing swiftness, even to the highest tops of the mountains." (*Edinb. Phil. Mag.* XIII, 34.) Dr. Horsfield also notices that "it prefers high situations, but is not limited to a particular region or climate, its range extending from the level of the ocean to the summits of mountains of considerable elevation.\*\*\* Its retreats are discovered by deeply excavated passages, which it forms along the declivities of mountains and hills.

I found these occasionally of great depth and extent." In Bengal, I believe that the identical species is found in the Sundarbáns, and also (formerly, at least,) in the Rajmáhal hills at all elevations; but it has hitherto been universally mistaken for *RH. INDICUS*, a species which may inhabit the same localities,---only that now remains to be ascertained, as also if *RH. SONDAICUS* extends its range to the region tenanted by the other. All evidence at present attainable points to the opposite conclusion.

So long ago as in 1838, the late Dr. Helfer remarked that—"The Tenasserim provinces seem to be a convenient place for this genus; for I dare to pronounce almost positively," he then wrote, "that the three known Asiatic species occur within their range. The *RH. INDICUS* being found in the northern part of these provinces, in that high range bordering on Zimmay called the Elephant-tail mountain; the *RH. SONDAICUS*, on the contrary, occupies the southernmost parts; while the two-horned *RH. SUMATRANUS* is to be found throughout the extent of the territories from the  $17^{\circ}$  to the  $10^{\circ}$  of latitude. In character the *RH. SONDAICUS* seems to be the mildest, and can be easily domesticated; the powerful Indian Rhinoceros is the shyest; and the double-horned is the wildest." (*J. A. S.* VII, 861.) Mason (in 1850) remarked that "the common single-horned Rhinoceros [*SONDAICUS*] is very abundant. The double-horned is not uncommon in the southern provinces:" and then he alludes to the alleged 'fire-eater' of the Burmans, supposing that to be *SONDAICUS*, as distinguished from "the common single-horned" kind, which he thought was *INDICUS*. Very decidedly, I consider that the alleged existence of the great sub-Himálayan *INDICUS* in Bengal, the Indo-Chinese region, and Malayan peninsula, remains to be proved; the broad and narrow types of skull of *SONDAICUS* having, I suspect, been mistaken for *INDICUS* and *SONDAICUS* respectively. That the real species denoted by these names was so early discriminated, I opine is mainly due to the accident of *SONDAICUS* having been first obtained in Jáva, which induced the suspicion of its being probably different from the only then recognised continental species, inhabiting Upper India; likewise to the accident of the Paris museum containing a particularly fine skull of the true *INDICUS*, which (as before remarked) is probably that of the individual figured in the *Menagerie du Museum d'Hist. Nat.*



The museum of the Calcutta Medical College contains, as we have seen, three noble skulls of *INDICUS*, besides that with the entire skeleton of an old female (both the broad and narrow types of skull being represented) ; but it has neither *SONDAICUS* nor *SUMATRANUS*. The Society's museum still wants the first species ; but is tolerably well supplied with the two others. Sir T. H. Maddock, in 1842 (*J. A. S.* XI, 448), presented us with two skulls of *SONDAICUS* (of the broad and the narrow types), and also with two of *SUMATRANUS* (one wanting the lower jaw),—all from the Tenasserim provinces : and the skulls of an old male and of an adult female of *SUMATRANUS*, the skin of the head of the latter, its *axis* vertebra, the long bones of the limbs (*minus* the right fore-limb and *scapula*), and the two scapulæ and long bones of the four limbs of the male, were presented to the Society by E. O'Reilly, Esq. (then of Amherst) in 1847 (*J. A. S.* XVI, 310, 502). In the *As. Res.* Vol. XIII, *App.* XVIII, “part of the head of a two-horned Rhinoceros” is recorded to have been presented ; and again, p. XIX, “the horn of a Rhinoceros from Sumátra.” The latter was not in the museum when I took charge of it in 1841 ; but the former I think that I recognise in a pair of united nasal bones (certainly belonging to this species), and in this case the specimen would probably be from a Sumátran individual.\* Of *SONDAICUS* we have also a fine series of skulls (one of them from Jáva, presented by the Batavian Society in 1844), the almost complete skeleton of a very nearly full-grown female (being considerably smaller than that of the female *INDICUS* in the Medical College museum), and the small stuffed specimen to which I have before referred : the limb-bones of the skeleton being considerably more robust than those of *SUMATRANUS*. For this skeleton, (and those of Elephant and Camel,) we are indebted to a former Náwâb Názim of Bengal ; and it is, doubtless, either from Rajmáhal or the Sundarbáns : the skull being of the broad type, though less strongly marked than some others, in fact intermediate, though scarcely quite mid-way intermediate.

The following notice by Sir T. Stamford Raffles may be advantageously reproduced here.

“The one-horned Rhinoceros of India is not known to the natives of this part of Sumátra ; and the single horns, which are occasionally

\* Add also the facial bones with small horns which I brought from Martaban.

procured, appear to be merely the longer horns of the two-horned species separated from the smaller one. There is, however, another animal in the forests of Sumatra never yet noticed, which, in size and character, nearly resembles the Rhinoceros, and which is said to bear a single horn. This animal is distinguished by having a narrow whitish belt encircling the body, and is known to the natives of the interior by the name of *Tennu*. It has been seen at several places; and the descriptions given of it by people, quite unconnected with each other, coincide so nearly, that no doubt can be entertained of the existence of such an animal. It is said to resemble in some particulars the Buffalo, and in others the *Badak* or Rhinoceros. A specimen has not yet been procured; but I have several persons on the look out, and have little doubt of soon being able to forward a more accurate description from actual examination.

“It should be remarked,” continues Raffles, “that the native name, *Tennu*, has, until lately, been understood to belong to the Tapir. It is so applied at Malacca, and by some of the people at Bencoolen. In the interior, however, where the animals are best known, the white-banded Rhinoceros is called *Tennu*, and the Tapir *Gindol*, and by some *Babi Alu*. It is not impossible, that, as both animals have white bands, the names may have been confounded by people little in the habit of seeing either, and deriving their information solely from report. In a country like Sumátra, where the inhabitants, in a great measure shut out from general communication, are divided into an infinity of tribes, speaking different dialects, a perfect consistency or uniformity of nomenclature cannot be expected, and it is not always easy to reconcile the synonymy.” (*Lin. Tr.* XIII, 269.)

It naturally occurs to the mind, that, if the *Tennu* really exists, it would long ere this have been discovered, in all probability, in the neighbouring Malayan peninsula: but how little is even now known of the great animals inhabiting that peninsula! The late Dr. Cantor, when he wrote his Catalogue of the Vertebrated Animals of the Malayan peninsula, was unaware of the existence there of *Bos SONDAICUS* in addition to *B. GAURUS*, only includes a two-horned Rhinoceros on the testimony of the Malays, and whether the *ELEPHAS SUMATRANUS* occurs on the mainland of Asia (like the Tapir and the two insular species of Rhinoceros, the *Bos SONDAICUS* and others,) is still undetermined. It is possible enough, though doubt-



less rather improbable, that such an animal as the *Tennu* may have escaped observation there even to this time. But it might not extend its range into the peninsula (as in the instance of the large *Siamang* Gibbon, which is peculiar to Sumátra); and not very much has been accomplished in the investigation of the zoology of the great island of Sumátra since the time of Raffles. At all events, I think the present opportunity a meet one to recal the subject to notice.

Baron Cuvier long ago remarked, I think in his *Leçons dans l'Anatomie Comparée*, that even then it was not probable that any more existing large quadrupeds remained to be discovered: and it is worthy of notice that no remarkable genus of large quadruped has been since brought to light, though additional species have been discriminated of several of the old genera. The small HIPPOPOTAMUS LIBÉRIENSIS of the late Dr. Morton is scarcely an exception; although since raised to generic rank by Dr. Leidy, by the name CHÆROPSIS.\* Of the three genera containing the most bulky of existing land quadrupeds, additional species have been distinguished; though, for the most part, they may not yet be universally accepted. Of ELEPHAS, the E. SUMATRANUS, Temminck and Schlegel (to which Sir J. Emerson Tennent refers the Ceylon Elephant†). Of Rhinoceros, a

\* *Journ. Philad. Acad., n. s., I, 231, II, 207.*

† The grinders of ELEPHAS SUMATRANUS are said to be intermediate in form to those of the Indian and African species; and I have just purchased a pair of table-weights, formed each of a thick horizontal section of an Elephant's molar-tooth, which seem to me to be of this species. The little boxes formed of sections of Elephant's molars, which are commonly brought from Galle, are (so far as I have seen) of the Indian species; but these are not necessarily from Cinghalese individuals. It is worthy of remark, however, that whilst among the Elephants of Sumátra and Borneo fine *tusk*ers would appear to be common (and the ivory is an article of export from both islands, as I am assured by a gentleman who has collected the article in Borneo), they are exceedingly rare among the Elephants of Ceylon; where, nevertheless, it has been suggested that *tusk*ers are so much sought after that they are seldom permitted to develope their ivories.

With reference to Sir J. E. Tennent's speculation regarding the former continuity of land between Sumátra and Ceylon—and Africa, of which the intermediate character of the ELEPHAS SUMATRANUS is one of his presumptive proofs, it may be remarked that the *two-horned* RHINOCEROS SUMATRANUS (with its only slight skin-folds) interposes a link between the two-horned and smooth-skinned African and the single-horned and mail-clad Asian species; but (not to allude further to the alleged existence of a single-horned African species) the presence of the second horn in RH. SUMATRANUS is much less remarkable, when we bear in mind the several fossil two-horned species of Europe and Asia, to which moreover the existing two-horned Asiatic Rhinoceros is much more nearly akin than it is to the different African two-horned species, as before remarked.

second black African species, the RH. KEITLOA, A. Smith (long previously indicated by Sir J. Barrow by the name *Jekloa*), and a second white African Rhinoceros, the (RH. OSWELLII, Elliot),—besides the RH. CROSSII, Gray (founded on the horn only, and the habitat of which is unknown); and of HIPPOPOTAMUS, the species of N. and S. Africa, respectively, are distinguished by Dr. Leidy and others (sinking *H. senegalensis*, auct., as a synonyme of the former), and there is also the H. or CHÆROPSIS LIBERIENSIS, which is a most undoubted species, considered—as we have seen—entitled to generic rank by Dr. Leidy. Whether external differences exist between the great Hippopotami of N. and S. Africa, remains to be shewn; as also in the case of the European and American Beavers, which Owen separated on account of differences in the configuration of the skull: in another animal first so discriminated, the PHASCALOMYS LATIFRONS, Owen, good external distinctions have since been discovered, which characterize it well apart from the PH. WOMBAT. Of other *Pachydermata* of Cuvier, more EQUI (of the *Asinine* type) have been added to the list; and several species of Swine. Among the *Bovine* ruminants, the three species of flat-horned *Taurine* cattle proper to S. E. Asia have only recently been properly distinguished;\* also the BUBALUS BRACHYCEROS of intertropical Africa; and there are others (as I believe) not yet sufficiently established, and more species also of large Deer and Antelopes. Among the *Carnivora*, no animal worthy of much note, unless *Phocidæ* (as might have been expected); and ditto with *Cetacea*—my BALÆNOPTERA INDICA for example (which is perhaps the largest of existing animals,—but these latter

Prof. Owen, in his late minute—‘On a National Museum of Natural History,’ (which I have only seen since penning the above,) writing of this genus, remarks—“There is also a two-horned Rhinoceros in Sumatra; and the Rhinoceros of continental India is one-horned, as is that of the island of Java.” He would appear thus to consider the RH. SONDAICUS and RH. SUMATRANUS as exclusively insular species. He further adds that—“The two-horned Rhinoceros of Sumatra offers, of all living Rhinoceroses, the nearest resemblance to certain fossil kinds found in Europe. When half-grown, this Rhinoceros retains a conspicuous coat of short, straight, bristly hair. It is generally known that one, at least, of the extinct European Rhinoceroses [RH. TICHORHINUS] was covered with hair when full-grown. \* \* \* What I have said of the Rhinoceros applies to the Elephant. Bishop Heber’s first announcement of the young hairy Elephant which he met with in the Himálaya mountains excited much surprise. This character, transitional in the modern Elephant, was persistent in the Mammoth, or northern Europeo-Asiatic Elephant.” The RHINOCEROS TICHORHINUS, it may however be noticed, is stated to have had no skin-folds.

\* Dr. S. Müller unites the three in his description of BOS SONDAICUS!



are not four-limbed). Among the *Quadrumanæ*, the grandest of all—the huge Gorilla—has been re-discovered; for its reputed existence was regarded as fabulous by Baron Cuvier. Lastly, in the bird class, it is most remarkable that the number of *brevipennate* species has quite recently been more than quadrupled\* :—still, however, no remarkable new genus, excepting the New Zealand Moa; and of this at least two species have just been discovered to maintain a lingering existence, as I have learned from a letter recently received from Mr. E. L. Layard, who is at present in New Zealand as Private Secretary to Governor Sir G. Grey. One of these, of comparatively small size (about  $3\frac{1}{2}$  ft. high), has actually been killed and eaten by a famishing party of explorers and *fifteen* others seen. Of the other, one of the large Moas, only the fresh foot-steps (15 in. long) have been traced, as Mr. Layard states by a party who had lost themselves; and therefore the instance does not appear to be the same as that lately recorded in the *Zoologist* (p. 7847). Both of these living species inhabit the little explored Middle Island.†

*March 1st, 1862.*

\* *Vide J. A. S.* XXX, note to p. 92. Even a *sixth* Cassowary has since been added by the Baron von Rosenberg of Amboyna. It is from the island of Salawatti; and has *no wattles*, as in all the others. He terms it *CASUARIUS KAUPF.* *Vide Ibis*, July, 1861, p. 312. The *BALENICEPS REX* must be considered as a remarkable discovery among large birds; and this is quite a new genus.

† The notice in the *Zoologist* is copied from the *Nelson Examiner* of July 12th, 1861. It is as follows :—“About three weeks ago, while Mr. Brunner, Chief Surveyor of the province, and Mr. Maling, of the Survey Department, accompanied by a native, were engaged in surveying on the ranges between the Rewaki and Takara rivers, they observed one morning, on going to their work, the foot-prints of a large bird, whose tracks they followed for a short distance, but lost them at length among rocks and shrub. The size of the foot-prints, which were well defined wherever the ground was soft, was fourteen inches in length, with a spread of eleven inches at the points of the three toes. The foot-prints were about thirty inches apart. On examining the bones of a foot of a Moa in the museum, we find the toe to measure, without integuments, eight inches and a half, and those evidently form part of a skeleton of a very large bird: the length of the impression of the toe of the bird in question was ten inches. The native who was in company with Messrs. Brunner and Maling was utterly at a loss to conjecture what bird could have made such a foot-print, as he had never seen anything of the kind before. On a subsequent morning similar marks were again seen, and, as a proof that they had been made during the night, it was observed that some of them covered the foot-prints of those which the party made the preceding evening. The size of these foot-prints, and the great stride of the supposed bird, has led to a belief that a solitary Moa [why one only?] may yet be in existence. The district is full of limestone caves of the same character as those in which such a quantity of Moa bones were found, about two years ago, in the neighbouring district of Asrere. We believe that it is the intention of the Government to take steps to ascertain the character of this gigantic bird, whether Moa or not, which keeps watch in these solitudes.”



*P. S.* No. 1. In a letter dated May 10th, from Bangkok, just received from Sir R. H. Schomburgk, he writes—"Will you believe me, I have never met with an example of that formidable animal, the Rhinoceros ! They are more towards the east, in Cambodia and Anam, although they are likewise to be met with in the north ; for, amongst the remarkable events of 1860, Dr. Bradley notes, in his 'Siamese Calendar' under April 5th, that—"A Rhinoceros was brought to the city from the north. Though a great curiosity, it was little thought after, because of a prevalent notion that his way had been heralded by the cholera, and that the effluvia from his body was almost sure to give that disease.' They are strange people, these Siamese :

Mr. Layard further writes, that—"The fabulous Otter of the natives [*qu.* a species of *ORNITHORHYNCHUS* ?] has also been seen and shot at by Europeans ; and a new large green Ground Parrot ; also a huge land shell (not *HELIX BUSBYI*), on the tops of fir-trees on the same island."

Since transcribing the above, I find that a further notice of the existing great Moa appears in the 'Proceedings of the Royal Geographical Society of London,' Vol. VI (1862), p. 25. It is a repetition of the account in the 'Nelson Examiner.' Mr. T. H. Hood, Member of the Legislative Council of Queensland, writes to Lord Ashburton,—“There is said to be a possibility that the British Museum may still be adorned by a *DINORNIS* : the footsteps of a gigantic bird, it is stated, were seen by a surveyor's party ; they were 14 inches long, and 11 in. wide on the spread, and they had been impressed during the night over the tracks of the men made on the previous day. All the wingless birds existing in New Zealand are nocturnal in their habits ; and the general impression from Maori tradition is, that the Moa was a gigantic *APTERYX*. The district is exceedingly rocky, and full of caves, in some of which it is just possible that a surviving individual may find its hiding-place. Exertions are being made (the last steamer's mail brings us intelligence) to ascertain the truth of the report, and, if correct, thoroughly to search the wild and unsettled districts where it is said to be. Certainly this would be a most interesting event to naturalists, should the search prove successful. I must say that I feel somewhat sanguine on the subject ; as once, when in that part of the Middle Island, I heard of a very circumstantial account given by a man, who stated that he had seen a great bird go down into a rocky glen one morning at daybreak ; but the story was not credited. The surveyor who now makes the statement is understood to be a man of character.”

For a Report on the four ascertained living species of *APTERYX*, by Mr. P. L. Selater and Dr. F. von Hochstetter, *vide* 'Natural History Review,' October, 1861, p. 504.

“Let me again refer,” remarks Prof. Owen, “to the ratio at which the zoologist's knowledge of the class [*Mammalia*] has proceeded of late years ; viz. from, say, 1,350 species in 1830, to 2,000 in 1855, and 2,500 in 1860. In one order, *e. g.* *Marsupialia*, the increase has been, from 50 species, recorded in 1830, to 350 species, in 1860. We should greatly over-estimate our present knowledge were we to rest upon it a conclusion that there remained but very few more forms of mammalia to provide room for in our museums. Look, for example, at the recent unexpected augmentation of the species of the quadrumanous order, by the researches made by Dr. Savage and M. du Chaillu, in a limited, but previously unexplored, tract of tropical Africa,—species including the largest as well as the most highly-organized forms of the order that comes nearest to Man.” (*Athenæum*, July, 1861, p. 120.)



while the rasped horn and the coagulated blood of the animal are considered remedies in various diseases, they consider its effluvia as dangerous to the health."

*P. S.* No. 2. I am just able to insert the following extract from a letter, posted at Galle, from Mr. W. T. Blanford (now on his voyage to Suez). He writes—"It may be interesting to you at the present moment to know that the Rhinoceros of the Shan hills east of Ava is one-horned. The people at the capital assured me that two-horned Rhinoceroses were [there] unknown. The Rhinoceros of the southern portion of the Arakan hills is two-horned. I am not sure that the one inhabiting the higher portion of the hills on the Pegu side, and of which I once or twice saw tracks in the Henzada district, is identical. The tracks appeared to me to be larger [as those of *RH. SONDAICUS* would be].

"I was told at Mandalé of a wild Horse (or a wild Ass) on the mountains of Theinin in the Shan states east of Ava. I at first thought that only the *Næmorhædus* [*CAPRICORNIS*] was meant; as that animal is known in Pegu, but not in Upper Burmá, as the 'wild Horse.' My informant, however, when I suggested this, said that he knew the 'wild Goat' perfectly well; and that the animal he referred to was a wild Horse, or perhaps, he added, *rather a wild Ass than a wild Horse*. Can this be the *Kyang* of Tibet?"

*P. S.* No. 3. When I referred to the *ELEPHAS SUMATRANUS* in p. 165 *antea*, I had not seen Prof. H. Schlegel's paper on this animal, a translation of which is published in the 'Natural History Review' for January, 1862. This I have chanced to light on, just in time to avail myself of it here. To Prof. Schlegel is due the identification of the Cinghalese Elephant with that of Sumatra: and, according to this naturalist,—“It is well known that Sumátra is the only island of the Indian Archipelago, where Elephants are found wild. Magelhaens has informed us, that the Elephants which he saw in Borneo, were introduced there; and that the animal is as little indigenous to that island as to Jáva.” From the information which I have received, however the statement of Magelhaens may hold true that the tame Elephants which he saw in Borneo were imported animals, it seems improbable that the race now wild upon that great island, and at this time sufficiently numerous in individuals

for their ivory to be an article of commerce, can have descended from an imported stock. My principal informant on the subject, to whom I have applied for what further information he may be able to give me, is Capt. Mottley (at present of Akyab), brother of the naturalist whose name is associated with that of the Rev. Mr. Dillwyn in Messrs. Mottley and Dillwyn's 'Fauna of Labuan' (and who perished with his family in the massacre at Banjermassing). Capt. Mottley was long associated with his late brother, as he mentioned to me in conversation, when I was at Akyab. In a paper on Borneo published in the 'Singapore Chronicle' for December, 1824 (and reprinted in Moor's 'Notices of the Indian Archipelago'), we are told that—"Of land animals, there exist the Elephant, the Rhinoceros, a species of Leopard [*FELIS MACROCELIS*]*—*but not the royal Tiger," &c. &c. "The first three animals, it is singular enough, are found only in a single corner of this vast island, its northern peninsular extremity, in the districts of Ungsang and Paitan. \* \* \* The Ox [*BOS SONDAICUS*], under the name of *Tambadao*, is a native of the forests of Borneo; and so is the Hog" [*SUS BARBATUS*]. In a sketch of Borneo, or *Pulo Kálámantan* (the Malayan name of the entire island, as distinguished from its province of *Borneo*), communicated by J. Hunt, Esq., in 1812, to Sir T. S. Raffles, then Lieut.-Governor of Jáva, (and also reprinted in Moor's 'Notices of the Indian Archipelago,') it is stated that—"The Elephant was said to be seen about Cape Unsing, where several teeth are still found; but it is conceived that this animal is extinct on the island." These are the only printed notices that I can at present recal to mind, relative to the existence of Elephants in Borneo.

The only species of Elephant, which, according to our present knowledge, is known to inhabit *India* proper—as distinguished from Indo-China and Malasia (or Malayana),—Prof. Schlegel designates as the "so-called *ELEPHAS INDICUS*;" and he remarks, that, so far as he "could discover, the greater number of Elephants brought to Europe from continental India, have been obtained from Bengal. It remains therefore a question," he adds, "whether all the Elephants of continental India belong really to one species, or whether, in these widely extended regions, there may not be different species of Elephants, and the Elephant of trans-Gangetic India may not perhaps belong to *E. SUMATRANUS*. A similar question may be asked



with respect to the Elephant of Southern India, compared with the *E. SUMATRANUS* of Ceylon, since these districts approach one another very nearly. We have, it is true, no more reasons for answering these questions in the affirmative than the negative; but they must be determined by ascertaining the facts, in order to know the exact boundaries of the range of *E. INDICUS*."

On this subject, I have to remark, that (at the present time at least,) the Elephant is quite as much an imported or introduced animal in Bengal proper, as it is in Jáva; for the very few that roam the Rajmahál hills are known to be animals escaped from their quondam human owners, and perhaps there may be some that are the progeny of such escaped animals. The appellation of "Bengalese Elephant," habitually made use of by Prof. Schlegel, is therefore inappropriate; although wild Elephants do exist, chiefly on the eastern outskirts of the province, and along the base of the Himálayas. I have not had the opportunity of examining the grinders of wild Elephants from the peninsula of India; but I have lost no chance of examining those of wild Burmese Elephants, which indicate the species to be *INDICUS*, as distinguished from *SUMATRANUS*. Even here I must remark, that the tame Elephants employed at Moulmain, so celebrated for their intelligence in piling timber, &c., (which feats I have witnessed,) and also those extensively employed in the teak-forests of the interior, are brought down all the way from the Shan states; the Burmese method of *hunting* wild Elephants proving successful only in procuring small individuals, below the commissariat standard, and unequal to the labours imposed by the timber-merchants. The entire Indo-Chinese region (or 'trans-Gangetic *India*,' though even 'Hither China' would much better express the affinities of the human inhabitants,) would appear to be emphatically the main *habitat* of *E. INDICUS*, seemingly extending down the Malayan peninsula in one direction, and along the southern base of the Himálayas in another: there are still many in the Deyra Doon; and others in Cuttack, Central India, Malabar, &c., which it has now become desirable to examine more critically.

According to Professor Schlegel,—“The Elephant of Sumátra and Ceylon (*E. SUMATRANUS*) has small ears, like *E. INDICUS*; and approaches this species also in the form of its skull, and the number of the caudal vertebræ: but the laminæ of its teeth are wider; and

in the number of its dorsal vertebræ and pairs of ribs, it differs from both the other known species. As far as we know, there are seven cervical, three lumbar, and four sacral vertebræ in all the species of *ELEPHAS* alike. *E. SUMATRANUS* and *E. INDICUS* agree in the number of caudal vertebræ, which is usually thirty-three, but in very young examples sometimes only thirty. In *E. AFRICANUS*, on the other hand, the tail never contains more than twenty-six vertebræ. Finally, the number of dorsal vertebræ and pairs of ribs are different in each of the three living species of Elephant; being in *E. AFRICANUS* twenty-one, in *E. SUMATRANUS* twenty, and in *E. INDICUS* nineteen.\*

“It is also remarkable, that the number of true ribs is alike in all the species, that is, only five; whilst in the three species, as above given, the corresponding numbers of false ribs is fifteen, fourteen, and thirteen. Hence it follows that the augmentation of these parts, in the different species, takes place in the direction of the hindmost dorsal vertebræ and pairs of ribs.

“The laminæ of the teeth afford another distinction, which, however, is less apparent to the eye than that taken from the number of the vertebræ. These laminæ, or bands, in *E. SUMATRANUS* are wider (or, if one way so say, broader in the direction of the long axis of the teeth,) than in *E. INDICUS*. In making this comparison, one must remark that the distinction is less evident in younger individuals; and that there are met with, in all species of Elephants, within certain definite limits, remarkable individual differences in respect of the width of these laminæ.

“In their external form, also, the two Asiatic Elephants appear to present some differences. Heer Westerman, Director of the Gardens of the Zoological Society of Amsterdam, which has for several years possessed two female Elephants of moderate size, one [received] from Calcutta and the other from Sumátra, informs me, on this subject, that the Sumátran animal is more slender and more finely built than the Bengalese [wherever that might have originally come from!], that it has a longer and thinner snout, and that the rump at the end is more broadened and covered with longer and stronger

\* The skeleton of *ELEPHAS INDICUS* in the Society's museum, and also that in the museum of the Calcutta Medical College, are those of the true continental species, according to Professor Schlegel's diagnosis.



hairs, in which respect it reminds one rather of the African than the Indian Elephant, and, lastly, that the Sumátran animal is more remarkable for its intellectual development than the Indian.\*

“The last mentioned observation agrees, in a remarkable way,” continues Prof. Schlegel, “with what Heer Diard has lately written concerning the Elephant of Ceylon. He says, on this matter,—“l’Elephant de Ceylan se distingue de celui des Indes par une aptitude d’intelligence instinctive, celle de facile éduabilité: aussi ces Elephans de Ceylan, de tout temps recherchés par les Princes de l’Inde se trouvent l’être encore aujourd’hui plus qu’aucun autre par les Anglais pour les différens services auxquels on les emploie. J’ai eu l’occasion d’observer plusieurs grandes troupes de ces animaux et une particulièrement, qui avais finie par se laisser prendre dans une grande enceinte établié par les ordres du Gouvernement, qui a cette époque ou la guerre de l’Inde était encore loin d’être terminée faisait tout ce qu’il est possible pour recruter un certain nombre de ces animaux afin de les diriger vers le Bengale.”

From my own familiar observation of the intelligence of tame Elephants, whether in Lower Bengal, Oudh, or Burmá, I am inclined to doubt exceedingly the alleged fact of the superior qualities, in this respect, of the Cinghalese Elephant. Individual differences occur, no doubt, as in other animals; and no slight diversity of character. I also do not remember that any Elephants arrived at Calcutta from Ceylon during the period of the repression of the Indian mutinies; though some may have been sent, likely enough, from that island to Madras. The grand importation, at that time, of Elephants into Calcutta was from the ports of Rangoon and Moulmein; and the animals in question were brought thither from the Shan states beyond the British boundary.

The assigned *habitat* of Calcutta for a tame Elephant may be estimated from the following extract:—

Col. A. P. Phayre, now Chief Commissioner of British Burmá, remarks, in his ‘Report on the Administration of the Province of Pegu’ during 1858-9, that—“Not less than one thousand and thirty-four (1,034) Elephants have been shipped from Rangoon and Moulmein, for the Madras coast and Bengal, during the period extending

\* It may here be noticed that Prof. Schlegel has reason to suspect the existence of more than one species of African Elephant.

from Dec. 1857 to April 1859. It may be assumed," continues Col. Phayre, "that so many of these powerful animals were never before, whether in ancient or modern times, conveyed across sea, or otherwise from one country to another, in the short period of seventeen months, whether for military or other objects." And of this great number, it may be added, that not a single one will probably have propagated its race after its capture! A young Elephant was born, I learned, on its voyage from Moulmein to Madras, survived the voyage, and was alive a year or more afterwards, if not at the present time, as is most probably the case.

On application to the Military Commissariat Office, I am obligingly informed that—"The following is an account of the Elephants received in Calcutta from Moulmein and Rangoon.

|               | <i>" Moulmein.</i> | <i>Rangoon.</i> |
|---------------|--------------------|-----------------|
| " 1857 .....  | 20                 | 50              |
| 1858 .....    | 422                | 34              |
|               |                    | <hr/>           |
|               |                    | 84              |
| 1859 .....    | 300                |                 |
|               | <hr/>              |                 |
|               | 742                | 742             |
|               |                    | <hr/>           |
| "In all ..... |                    | 826             |

"I do not know," continues my informant, "how many more were landed in the Madras Presidency.

"No Elephants were received at Calcutta from Ceylon."

The accuracy of the foregoing statement may be fully relied on.

*P. S.* No. 4. The genera ELEPHAS and RHINOCEROS were placed by Linnæus (Gmelin's *edit.*, *A. D.* 1788,) in his order *Bruta*; while he associated the Horse with the Hog and the Hippopotamus in his order *Bellua*. It is remarkable, too, that he refers to Rhinoceroses bearing a third horn.\* Báber, it has been remarked, hunted some species of Rhinoceros on the banks of the Indus; and in Dr. Parsons's description of a Rhinoceros procured when young by "Humphrey Cole, Esq; being Chief of the Factory of Patna in Bengal," in the *Phil. Trans.*, Vol.

\* To his description of *Rh. bicornis*, it is added—"Rarior est *Rhinoceros tricornis*, tertio tum cornu ex alterutro priorum excrecente."



XLII (*A. D.* 1742-3), we read of "many Gentlemen, who had seen those Creatures in *Persia*, and other Parts of the East." Can this reference to *Persia* be a mistake? Or were such animals, at little more than a century ago, occasionally conveyed (when young) from the *Indus* to the Persian Gulf? Rather than from the eastward of Cape Comorin? Were it not for the locality assigned, I should have been inclined to suspect that Parsons's figures were intended for *RH. SONDAICUS*, from the somewhat greater elevation of the limbs, the more evenly (though too coarsely) tuberculated hide, and especially the delineation of the nape region, as compared with the figures by Edwards, Buffon, and Cuvier and Geoffroy. At the same time, I have already noticed, that the hide of the Lesser One-horned Rhinoceros of Bengal is by no means so neatly tessellated in appearance as is shewn by Dr. S. Muller's figure of the Javanese Rhinoceros.

I find that I was wrong, in p. 163 *antea*, in stating that our Rhinoceros-skeleton was presented by a late Nawáb Nazim of Bengal. Three skeletons, those of Elephant, Camel, and Tiger (the last now replaced by a much finer one), were presented in 1839, by His late Majesty of Oudh, Nussir-ud-Dowlah, *J. A. S.* VIII, 688. For the history of our Rhinoceros-skeleton, *vide J. A. S.* III, 142, IX, 518, X, 928. The animal was killed in the Jessore district.



*On some Bactro-Buddhist Relics from Ráwal Pindi.—By* BÁBU  
RÁJENDRALÁLA MITRA.

In February, 1861, Capt. Stubbs, of the Artillery, forwarded to the Asiatic Society, through Col. J. Abbott, draughts of certain interesting relics found in a field 23 miles to the north-west of Ráwal Pindi, and between the villages of Shah ke Deri and Osman Khatur. The place is said to be rocky and covered for many miles with fragments of dressed stones and ruined buildings which have, in some spots, formed mounds of considerable height, overgrown with jungle. Traces remain of some of the buildings having been made of quarried stones with lime mortar. Copper coins and fragments of statuary are also met with. The relics under notice were exhumed by two zemindars of the place while digging among some mounds in quest of treasure. They had been evidently deposited in the centre of a masonry building, the foundation of which was met with at the

depth of 2 or 3 cubits from the surface of the ground. Mr. G. D. Westropp, Extra Assistant Commissioner, Ráwal Pindi, to whom they were made over by the discoverers, states that they consist of—

“1st, a circular stone trough about one foot in diameter and three inches in depth, beautifully turned and polished. Its outer resemblance is that of a large cone cut away at  $3\frac{1}{2}$  or 4 inches above its base. The trough has three grooved circles diverging from the base of a small cone which rises about  $1\frac{1}{2}$  inches from its centre. The rim, sides and bottom of the vessel are not more than  $\frac{1}{2}$  an inch in thickness. The stone is of a dark green colour, interspersed with white spots, and from this circumstance, as well as from its hardness, I am led to conclude that it is either porphyry or some other description of granite. It is remarkably free from flaws and defects.”

“2nd, a crystal figure which was inverted on the small centre cone described above. The figure represents the shape, wings and tail of a duck with the head of a turtle. It is delicately carved, and in a state of good preservation.

“3rd, a piece of gold leaf about three inches long, by one broad, bearing an inscription in some unknown character. The letters are in relief and perfectly clear and distinct.”

Fig. 8 of the accompanying plate represents a reduced sketch of the trough. It differs from the Manikyala and other Buddhist vases in being the segment of a cone and not of a cylinder, and in having the peculiar conical projection in the centre, the counterpart of which has nowhere else been noticed. Neither Mr. Westropp nor Col. Abbott makes any mention of a cover for this trough, but judging from the perfect state of preservation of the crystal figure and the gold leaf, and also from the circumstance of all the memorial troughs or basins hitherto discovered having been supplied with lids, I believe this too had one which was probably destroyed in the act of exhumation. Its exact dimensions are, upper diameter 11 inches, lower do. 12—7; depth within 1—85; depth outside 2—4. It probably contained the ashes or some other mortuary remains of the saint whose name is recorded on the gold leaf.

The crystal figure is a well formed round cup bearing the head and tail of a duck, with the wings indicated by cross lines on the sides. It measures 4 inches in length and 2-7 in breadth, the height being 1-8. The interior diameter of the cup is 1-8 and its depth 1-2. Fig.



9 is a reduced sketch of its side view, and Fig. 10 of its under surface. The places of the feet are indicated by two holes on each side, and at the centre of the tail there is a small perforation : the cup has a flaw under the neck.

As a funeral or Buddhist emblem I have never noticed a duck ; and among the figures published by Mr. B. H. Hodgson in the Transactions and Journal of the Royal Asiatic Society of London,\* the peacock and the hawk are given as Buddhist signs, but no anserine animal of any kind. A story is current, however, that when S'ákya shed his top-knot at Benares, his hairs assumed the form of a flock of geese, which flew away towards the north, and it is possible that the figure under notice, was designed to commemorate that event in the life of the founder of Buddhism. But the inscription is entirely silent on the subject. It records the death of a saint who, notwithstanding the distinctive epithet of Bhagava, was evidently not S'ákya himself, and it would not be consistent to suppose that the record and the emblem allude to two different individuals. I feel disposed to think, that they refer to the same person. This idea gains strength from the circumstance of superior intelligence having been assigned to the duck under the name of *hañsa* in the Hindu Shástras. The Chhándogya Upanishad gives an anecdote of two geese, one of which, while flying over a palace, warned its companion to keep clear of the majesty of the king below. The Rámáyana and the Mahábhárata, have likewise several anecdotes in which *hañsas* are alluded to. In a curious work on omens by Vasantarája (8th section) it is said that "the sight of a *hañsa* in any direction, when proceeding on an expedition, is a sure augury of success. The hearing of its cackle is likewise efficacious, while its name is destructive of all sin."† In another place it is said, that "the cackle of a duck (if heard by a man only once when proceeding on an expedition) is an augury of thieves in the way ; if heard twice, of gain ; if thrice, of danger ; if four times, of war ; and if five times, of royal favours."‡

\* T. Vol II. p. 222, J. vol. XVIII. p. 393.

† काष्ठासु सर्वस्वपि दर्शनेन हंसस्य शब्देन तु सर्वसिद्धिः ।

नामानि हंसस्य शृणोति यस्तु प्रयान्ति नाशं दुरितानि तस्य ॥

‡ चौरैः समं दर्शनमाद्यशब्दे निधिर्द्वितीयेऽथ भयं तृतीये ।

युद्धं चतुर्थे वृत्तिप्रसादः स्यात् पञ्चमे हंसरवे नराणाम् ॥

According to popular belief the hañsas have the peculiar power of abstracting the milk from a mixture of milk and water, and leaving the water behind. Absurd as this belief is, it has led to the hañsa being reckoned as an emblem of superior powers of discrimination, and seldom does a Bengali author write a book in which he does not request his readers to separate, like the hañsa, the cream of his composition from its aqueous adjunct. In the Mahābhārata this is alluded to in the Udyoga Parva\* where a great Brāhmaṇa teacher is named the *Hañsa* or “the goose” who was to separate the cream of theology from the dross of secular learning. It is probably from this circumstance that the term, from originally meaning “a duck,” “a goose,” “a swan,” or “a flamingo”† came to mean the omniscient Brahmá,‡ the benign Vishṇu, the plenipotent Śiva, the all-observing sun and, metaphorically in composition, “the best,” “chief,” or “excellent.” The Jogis took it up as a term elect to indicate the vital airs, and many mystical prayers were got ready for the adoration of the deity as the *Hañsa*.§ Those who adopted this mystical prayer were generally ascetics, and hence several sects of Jogis used it as a title for their spiritual teachers. Subsequently the term had the augmentative prefix *parama* added to it, and in that compound form, it occurs frequently in the Bhāgavat where Śrīdhara Swāmi explains it by the words सारसार-विवेक-निपुणः or “possessed of the knowledge of substance and dross, or truth and untruth.” When the term came to be used as indicative of a Vedantist ascetic it is difficult to determine, but it occurs very largely in the polemical literature of mediæval India. However ridiculous the title may appear in its English version of “the great goose,” Śaṅkara adopted it as pre-eminently his own,|| and most of his successors called themselves *Paramahañsas*. Several teachers of great eminence before the time of Śaṅkara likewise had the same title, and it may be traced

\* Chapter 35, Vol II. p. 137.

† Vide my translation of the Chhāndogya Upanishad p. 66, foot note.

‡ The vehicle of Brahmá is likewise named hañsa.

§ हंसेति प्रकृतिर्ज्ञेया औङ्कार प्रकृतेर्गुणाः ।

हङ्कारेण वहिर्याति सकारेण विशेत् पुनः ॥

|| The following is his definition of hañsa as given in his treatise on inference, *Aparokhānubhūti*.

चौरात्रीरं पृथक् कृत्य हंसो भजति नान्यथा ।

चौरनीरविवेकज्ञो हंस एव न चापरः ॥



Fig. 1



Fig. 3



Fig. 2



Fig. 5



Fig. 4



Fig. 6

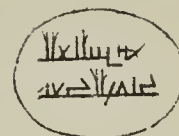


Fig. 9

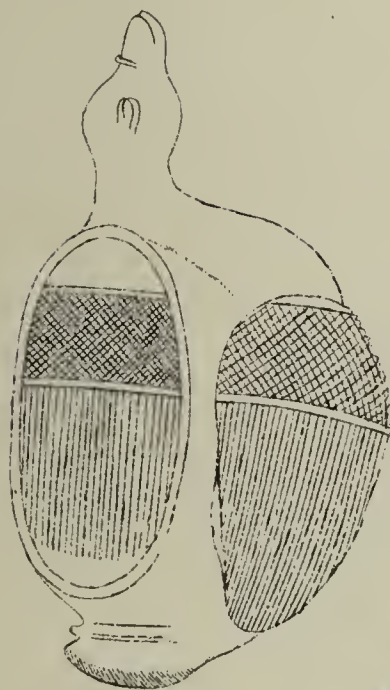


Fig. 7



Fig. 10

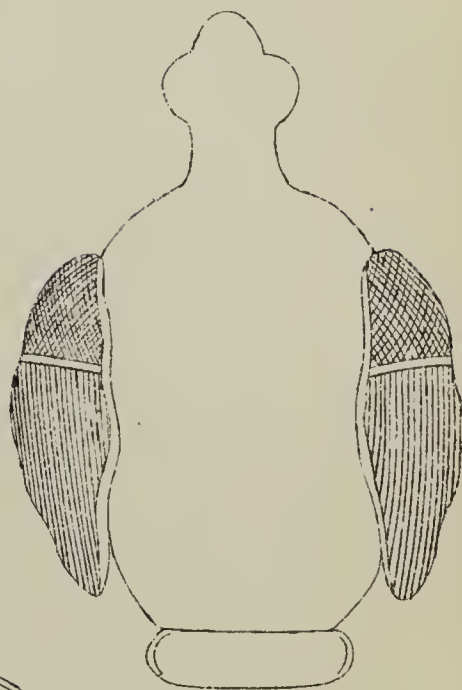


Fig. 8

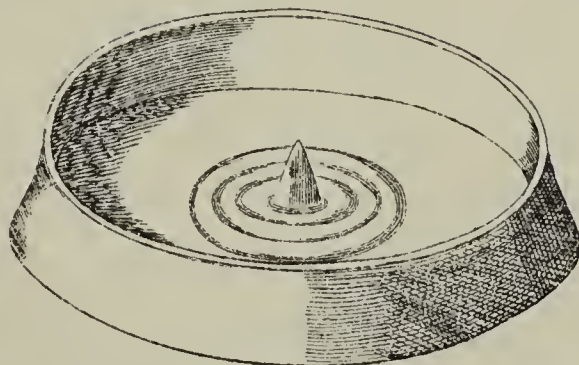


Fig. 11

ΣΑΛΑΓΓΕΝΙΣΤΕΡΓΗ  
ΖΑΛΑΓΓΕΝΙΣΤΕΡΓΗ  
ΧΥΖΥ





as far back as the 7th century. In its simple form it must have been in use long before that time, and as the Jogis, as a sect, are of very ancient date and notices of their rigorous penances occur in books many centuries before the commencement of the Christian era, it would not be too much to suppose that the term *hañsa* was well known at the time when the Bactrians held sway in Western India. If this be admitted, bearing in mind the well-established fact of the Buddhist having borrowed most of their terminology from the Hindus, it would not be unreasonable to suppose that the duck under notice, was placed in the monument as an emblem of the superior intelligence of the saint whose memory it was to perpetuate.

The inscription (Fig. 11) is in Arian characters, its language being Páli, similar to that of the Kapur-di-giri edicts of As'oka, and the Wardak record of the time of Huvishka. The letters have been punched on the gold leaf, and are in an excellent state of preservation, but several of them are peculiar in shape, and the difficulty of ascertaining their phonetic values throws much doubt on the meaning of the whole record. Moreover in the Arian alphabet, as far as yet known, four different letters either by themselves or with their vowel-marks, appear very much alike, and they constantly lead to misapprehensions and mistakes. They are all formed of an oblique line bending to the left with a top stroke more or less curved. The letters alluded to are *v*, *r*, *t*, and *b*. Of these *v* perhaps is the most characteristic with its perfectly horizontal top line, and yet it is liable to be mistaken for an *r*; the *r* is liable to be confounded with *t* and *b*, and the *t* has a strong tendency to merge into *b*. The *l* too in the first line of the Kapur-di-giri inscription has some resemblance to *b*. The *v* stands at the fourth remove from *b* and is not often liable to be mistaken for it, nor for a *t*, and yet when the horizontal top stroke is modified by a perpendicular stroke at its end to indicate the long vowel *á*, nothing save the context is left to guide the decypherer to their values, and even that dubious guide fails him whenever he has an unknown proper name with any of these letters before him. I feel myself, therefore, in my reading of the record, freely open to correction, and if I publish it in its tentative form, it is only to provoke enquiry, and to assist the researches of others into a subject fraught with the deepest interest in connexion with the history of Bactrian domination in India. I presume not to apply the "verifying faculty" so as to convert the plausible into the certain.

The first word of the record appears to be distinct enough; the syllables are *s'i*, *ri* and *e* = *s'irie*, the singular dative in Páli of *s'ri*; the meaning being, "For the sake of prosperity." The first and the third syllables are undoubted, the second may be read *ti*, *vi*, or *ri* at option, the *t*, *v* and *r* being, as aforesaid, liable to be confounded.\* It has been taken for *ri* because no meaning can be got with *vi* or *ti*. Besides, in Oriental writings the word *s'ri* is always reckoned to be an appropriate beginning for a grave document, as it is supposed to be highly conducive to prosperity. The second word is *Bhagava*. When I first met it in the Wardak monument, I had some doubts about my reading, and I adopted it only on the analogy of the Burmese vocative of Bhagavan, but in Major Kittoe's collection of unpublished inscriptions, there is a Páli record in the Lát character, which has the word very distinctly in two places, and there seems to be no reason to object to it any longer.

The syllable immediately succeeding *Bhagava* is of a very doubtful appearance. It makes the nearest approach to a *bo*. In Mr. Thomas's plate† the lapidary *b* is written thus S, and if the vowel mark for *o* be put about its middle it would be changed to a shape, which would be very nearly that of the letter in the inscription. The vowel cannot be *u*, as that letter in the Kapur-di-giri record is given in a different way with a horizontal stroke at foot. The *dha* after it is undoubted, and then the first syllable is repeated. The *prá* which follows next is well formed and not liable to be questioned, but what the next syllable is, is quite uncertain. Taking it at a random for a *jna*, the whole word becomes *Bodhaboprájna*. Placed immediately after *Bhagava*, the word is expected to be the name of the saint whose death the record has to commemorate, but placed between two such pure Sanskrit terms as *Boddha* and *prájna*, it is not easy to account for *bo*, one feels disposed therefore to suppose that either it is a miscript for *bi* which is a very appropriate Sanskrita expletive meaning "certainty" and corresponding to the English adjunct *di* or *dis*; or the *jna* is a mislection of something else which with *boprá* made a proper noun, but what that is cannot now be guessed. If the syllable *bo* be taken for *te*, no advance whatever is

\* The facsimile prepared from a sealing-wax impression is not correct here. The original gold leaf has *ra* and not *ri*.

† Prinsep's Indian Antiquities, p. 166.



made towards an explanation of its meaning, and the *te* itself is generally written in a very different way. In the Behat Kunanda coins, the *jna* occurs in the form of an *h* reversed, while the form of the letter in question is like a double *v*, *𑖦*. If it be taken for the latter it would make the name Bodhaboprávva or Boddhateprávva, but without making any advance to its meaning: the word, however, being a proper noun, its meaning cannot be of much help, and I despair, therefore, of coming to the right reading without extraneous aid. The next word is *rátíyámaü*, *ráti* for *rátri* “night,” *yáma* “a watch,” or one fourth of the night, it being usual in India, as elsewhere, to divide the night into four watches. The *u* is supposed to be doubtful. I take it to be the case-mark for the locative. In the Lalita Vistara it is very largely used to indicate the omission of a case affix, and in the Hindi it is also met with.\* The meaning of the whole clause is “in the first watch of the night.”

The second line begins with a word which may be taken for “drinking of joy” or “drunk with joy,” from *hasisa* “laughter” and *piü* “drinking” or “having drunk.” The radicals of both the words are well known, and the only thing doubtful is the *si* in *hasisa*, particularly as the next word *hasasila* “laughing” or “joyous” is written without the *si*. The next word is *iva sasi* or “like the moon,” from *iva* “like” and *sasi* “the moon;” the letters are distinct and the meaning undoubted. The syllables which follow to the end of the line, are likewise distinct, except the last which looks more like *hra* than *ha*. Taking it to be *ha*, on the authority of the Kapur-di-giri record in which *h* sometimes occurs with a prolonged tail,† the question arises as to the property of using the word *yoha* “a flock” or “herd” with reference to men, in Sanskrita the use of its radical *yuha* being confined exclusively to beasts and birds. But perhaps it would be conceded that for a saint to call his pupils his “flock,” or for his pupils, disciples, and congregation to describe themselves as “his flock” even against the genus of the Sanskrita, is not such as to raise any serious obstacle to taking the word in that sense. The meaning would be “rising above his flock.” The last word of the record is

\* Vide my paper on the Gáthá Dialect, ante vol. XXII. p. 608.

† Since writing the above I have had an opportunity of examining the original gold plate, from which I find that our facsimile is not correct, inasmuch as it shews the tail of the *h* to be longer than it is in the original, where it is of the same relative size as in ordinary *hs*, only not quite as curved, the difference proceeding from a desire on the part of the engraver to avoid bringing it into contact with the right foot of the preceding letter.

the verb ; it is distinctly *vihayati* ; *vi* prefix *ti* the conjugational termination, and *haya* the root. In Wilson's Dictionary, this root is said to have four meanings "to move," "to worship," "to sound," "to be weary," but none of them seems to be appropriate. "To move" might be used in the sense of "to pass away." But a Buddhist would not in a hurry say of his saint that "he passed away." The more probable reading therefore appears to be *viharati*, a genuine Buddhist term for "taking pleasure" or "relaxation." To do this, however, the *ya* must be assumed to be a miscript for *ra*. But whether so assumed or not, the word must be taken as a metaphorical expression for death.

My reading of the entire inscription according to the above analyses would be शिरए भगव बोधवोप्राज्ञ रातियामउ हसिसपिउ हससिलु इव-ससी अतियोह विहरति ॥ and its translation : "In the first watch of the night, Bhagavan Bodhaboprájña or Bodhaboprávva, the joyous, for the sake of prosperity, drinking of joy, and rising above his flock, took his relaxation."

One objection to this reading of the text, though not a serious one, is its style which is much more artistic and high flown than would be suited to a Bactro-Buddhist epitaph ; but if the value assigned to the several letters composing it be admitted, the meaning cannot well be avoided. The only Arian records of any length that have yet been translated are the As'oka edicts of Kapur-di-giri and the Vase inscription from Wardak, and they are both, in nearly pure Páli. If they differ, the difference is due to their bearing a closer resemblance to the Sanskrit than to the Páli, and not to any deterioration from the Páli. Following the former, they retain the three sibilants and compound consonants with *r*, which are nowhere met with in the latter. The Arian legends on the bilingual Bactrian coins are likewise in Páli, and they fully justify the assumption that in the time of the Indo-Bactrian sovereigns the language of court and religion was the Páli, and since the inscription under notice is unmistakeably a Bactrian sepulchral record its language must be the same ; which being conceded, the meaning I have given to it follows as a matter of course. I have found that it is possible by a segregation and rearrangement of the different syllables—the words being engraved continuously in the original and not separated—to form new words with different meanings, but as they could not be held together by any grammatical cement, I have not thought proper to advert to them



here. I feel that my reading does some violence to two or three letters by assuming misscripts and mislections, but as it abides strictly by a language and a grammar, I trust it will be deemed preferable to any attempt at decyphering on my part which for the sake of a fancied fidelity to a few letters—and those of forms so dubious that they may be mistaken for several others and engraved at a time when the art of engraving was in its most primitive state,—would cast overboard all considerations of the laws of language.

The plate annexed to this paper, has impressions of six ancient gems now in the possession of Mr. E. C. Bayley, and of a Cufic seal in the cabinet of the Society. The gems were subjected to the examination of the learned scholar Dr. Martin Haug of Poonah, whose readings of the legends of five of them are here annexed.

“Fig. 1 represents the head of a Roman, the inscription in Sassanian Pehlevi can be read only as Calmilos. He was very likely in the service of one of the Sassanian kings, for we find in the British Museum a Daric, with the Greek inscription Pythagoras.

“Fig. 2 Sassanian Pehlevi Shahipuhri Mazd (ayasn) i. e. Shahpoor the Zoroastrian.

“Fig. 3 represented a cypress; the inscription is in Hebrew character, the language late Hebrew approaching Chaldaic, *Ab Habbaroth* Hab baruth, the name means owner of a Cypress אב *ab* means father, owner, and ברות Baroth is the Chaldaic form for Barosh cypress : ה *ha* before Baroth is the Hebrew article, not admissible in Chaldaic. As to the name, compare the name of the celebrated Babylonian historian Berosus.

“Fig. 4 contains very likely inscriptions in two languages, or, better, is the two dialects of Sassanian Pehlevi known from inscriptions. The upper inscription is in a kind of Hebrew character (used by the Sassanians) and contains evidently the name Damask. The inscription below bears some resemblance to old Armenian characters, but I cannot yet read them with certainty.

“Fig. 5 Sassanian Pehlevi inscription Baba i. e. Ktesiphon (occurring often in coins).”

Fig. 6 has not yet been read.

The Cufic seal (Fig. 7) was purchased from one Chanda Mull of Peshawar, a coin-dealer. Its substance is jet well polished, and the letters most beautifully engraved. The legend records the name of Isamel, son of Hamad.

*Remarks on the above by E. C. BAYLEY, Esq., C. S.*

As the relic with which the above note deals has also been for some time before myself, and as the conclusions to which I have come do not altogether, even as to the phonetic values of the letters of the inscription, concur with those above given, I presume to offer a few remarks.

I would venture in the first place, with all deference, distinctly to join issue with Babu Rajendra Lal as to the language proper of the Ariano-Pali inscriptions. To give the position which he assumes in his own words I quote from p. 182:—"The only Arian records of any length that have yet been translated are the A'soka edicts of Kapur di giri and the vase inscription from Wardak, and they are both in nearly pure Pali. If they differ at all, the difference is due to their bearing a closer resemblance to the Sanscrit than Pali."

If this assertion were even to its fullest extent accurate, I would point out in the first place, that the first example quoted gives no support whatever to the conclusion deduced from it. The language of the Asoka inscription was the language of Asoka—whose capital was in Behar. It was probably issued as a quasi religious edict even, and may have therefore rather adopted a sacred dialect than the current vernacular of that province, but even if it were not so, it proves little or nothing as to the vernacular of the countries North of the Jhelum. Asoka would, in a document of the nature of that he was promulgating, adopt naturally the alphabet, but not the dialect, of the locality, except perhaps in some very minor particulars.

As to the Wardak inscription, it must be remembered that in the first place *a very considerable proportion has even yet not been translated at all*. Much of this is, so far as the characters go, legible enough; for there is no dispute as to the phonetic value of the letters. Had they been capable of transmutation into "pure Pali" I am certain that they would hardly have so baffled Rajendra Lal himself; who would long since in such a case have solved the enigma of their meaning.

Even in the parts which he has rendered into English, there are some phrases which are hardly to be taken as "pure Pali" without a straining of the phonetic value of the letters, which, to say the least, is of doubtful admissibility; but passing over this point, there



are yet words which, accepted even in the sense which he has taken, are certainly not pure Pali nor pure Sanscrit:—for example, the word “Mahi Sachya” or “Mahi Sachha” in the 2nd and 3rd lines. The form of the demonstrative pronoun “iya” and “imena” approaches too more nearly to the form prevailing in the Perso-Pali of the Behistun inscription than to the Indo-Pali or Sanscrit. The proper names which occur in the Wardak inscription, moreover, are most of them certainly in no degree of a Sanscrit or Pali origin.

While therefore fully admitting that *a* dialect of Pali forms the groundwork of the language of the ordinary Ariano Pali inscriptions, I would venture to demur to the assertion, that it differs only from the ordinary Pali of India in “bearing a closer resemblance to the Sanscrit.”

The arguments adduced in support of this assertion have at least failed to prove it, and I may venture the rather to doubt its soundness, as I know that on a careful examination of the Wardak inscription, shortly before his death, the late Professor H. H. Wilson expressed a very opposite opinion.

Indeed the antecedent circumstances of the case are very much against the probability of the language, at least of any territories north of the Jhelum, being purely Pali, or Sanscritized Pali.

Whatever the predominating element of the population may have been, it certainly was *not* a purely Hindu population at any time between 300 B. C. and 200 A. D.,—the period to which most of the inscriptions which have come down to us, may be pretty safely assigned. The Bactrian branch of the great Arian family, to which most, if not all, of its subdivisions using the Semitic alphabets may with some likelihood be attributed, leaned in their dialect, according to Professor Haug, rather to that used by their Persian, than to that of their Indian brethren.

But what is of far more importance, during the five centuries named, and very probably for many others antecedently, these provinces had been the highway by which hordes of invaders of every class and stock had poured themselves upon India.

Many of these were unquestionably of a Turanian stock, and it is probable that of each successive army some portion settled itself on the soil by the way. The only wonder is, that the Arian element retained even so strong a position in the language as it evident-

ly did, and sufficient vitality to assert its supremacy and community with the Hindu element, as the facts of subsequent history so far as ascertainable would indicate. Albeit to this day many of the wild tribes (e. g. the Ghukkurs) who people the country even south of the Indus, can scarcely be considered as having ever fairly belonged to the Hindu race.

That a foreign element was strong in the trans-Jhelum districts at the period of which I have spoken, may be guessed from the familiar names of men and places, which are certainly for the most part anything but Pali or Hindu. These are indications of the tendency of the daily life of the races for whom the inscriptions were written, and I think that it may be fairly from them assumed, that the language of their common use must be, *primâ facie*, expected to partake of a similar character.

It is not therefore too much to say that in these regions at least (and perhaps this is true also to some degree and at some time of other parts of India) we should not *expect* the language of an inscription of the period to which we refer to be either pure Pali or Sanscritized Pali; and a version which renders it as such is, I think, therefore *ipso facto* open to doubt and suspicion. Of course under such circumstances more than ordinary jealousy and circumspection is necessary in "stretching" the phonetic value of any letter, to suit an intelligible reading.

Having said so much on this point, I wish to notice another preliminary objection to Rajendra Lal's version, which is the somewhat high flown character of the language as given by him. It is opposed to that which, as far as other inscriptions of the same period go to show, was employed at that time and in similar inscriptions. True, as Rajendra Lal has pointed out (in page 182) this argument is of little value if the reading of the inscription is in itself unimpeachable, but where, as here, that is *not* the case, it is an argument which goes some way to overthrow the probability that the version given is the correct one.

I am now bound to give the transliteration of the inscription, which appears to me to be correct, and having done this I will attempt to give a conjectural reading, open I am aware to very considerable doubt, but which still seems to me preferable to that above offered.

Before doing so I would observe that the phonetic value of but



three\* letters, viz., the 11th of the first line and the ninth and tenth of the second line, appears to me open to any doubt. I would also add that as I read the original sealing wax impressions, the 12th letter of the first line has the vowel mark of “e” which the plate as published does *not* give.

Of the three doubtful letters Babu Rajendra Lal would wish to read the first as “jna.” There is here even not only no *authority* for this reading, but a direct authority against it; “jna” occurs, as Rajendra Lal himself has pointed out, on the biliteral coins of Kanunda in a form which by no possibility can have been corrupted or converted into that here used. I am free to admit that there is no distinct example, so far as I am aware, of the character here employed, elsewhere—but it is in itself nothing more than a couple of “v” s placed the one above the other—the compound of two “v” s is not an uncommon one, and though probably such compound letters were not known to the earlier Pali, there is, I think, some ground for believing that they were gradually introduced into it. The compound of “s,” “t” and “r,” of “t” and “r,” of “s” and “p,” of “j” and “n” have been fully recognized and established by bi-literal inscriptions. There is, therefore, no antecedent improbability against the reception of the compound, and I believe that most of the characters in those inscriptions which are yet undetermined, are probably also compound.

The second doubtful letter, the twelfth of the second line, I agree with Rajendra Lal in rendering as “lu” or better perhaps “lo,” but the shape of the vowel mark makes the reading a little uncertain. The 13th letter is too in all probability a vowel, but I think rather “ó,” or perhaps “ú,” than “i,” as was rendered in the note above.

I may also point out that the 14th letter may possibly be either an “r” or a “t;” it certainly is not a “v” as rendered by Rajendra Lal, and all the other letters in the reading by which I differ from him may be seen at once by the parallel transliterations given below.

Babu Rajendra Lal’s

“Sirie bhagava bodhavo prajna”

“Ratīyāmaṭu† hasisapīṭa hasasilu”

“iva sasi atiyoha viharati.”

\* Since writing the above I have had an opportunity of examining the original gold leaf: the ninth letter may *possibly* be read as “ye.”

† The plate given omits the vowel mark which is that of the vowel “e.”

My reading after the three first words differs materially, as will be at once apparent.

Sirae Bhagava Bodhabo prevvavétiye

yè

matuha sisa pituha sasé

loota sasi atiyo hratehajati

As to the tentative reading which I am about to offer, it is necessary to say, that of four words it is very nearly, if not altogether, conjectural, of these three are the words "sisa," "sase," "sasi." It may perhaps be a bold guess and one which I confess is mainly founded on the context, but it is one which I nevertheless venture to offer, that these words are forms of one and the same word, and I further guess, that they represent the adverb "from," modified in concordance with the number and gender of the word to which they are attached as with us is the case with the modern well known "ka, ki ke," of the Hindustani genitive—originally also probably a similar quasi adverbial post position. If this conjecture be admissible, perhaps the form now found may be the ancient elaborate form of the modern Hindustani "sé." I put forward this guess with great diffidence, but it may be worth at least examination before it is repudiated.

The fourth word "loora," or better "loota," is one to which I can find no fair analogue. Col. Cunningham indeed informs me that he has met with the word "lūira" in some of the local Hill dialects as the equivalent of "children;" this expression would accord better with Rajendra Lal's rendering of the vowels than with my own; but at any rate if my general rendering of the inscription be correct, the word, whatever its exact form, must express some degree of kindred, specific or general.

My own version, I may state, accords generally with one which Col. Cunningham long since communicated to me, and on that account perhaps I have the rather inclined to put it forward, side by side with that of so distinguished a scholar as Rajendra Lal.

To begin with, I take the first fourteen letters to form two words only; the first, as suggested by Babu Rajendra Lal, an inflected form



of the word "sri," the latter a compound word containing as its first members the words "Bhagava Bodha" and inflected in concordance with "siräe." It is I believe composed of three or more words, the latter being the word "atiya" which I take to the Bactro Pali form of the Sanscrit atyaya (अत्यय = Death—) which word as I read it, occurs again towards the close of the 2nd line of the inscription.

The whole I take to be an invocation to Budha as a protector from calamity; the centre words may perhaps be some derivative of पृ to protect. I cannot, however, pretend to set forth more than the general sense as above given, say "To Bhagava Budha, the protector from calamity."

The remainder of the inscription then goes on to enumerate, as I understand it, the members of the writer's family as "matuha sisa pituhasase," "luota saši," "from my mother," "from my father," "from my children?" and to conclude with a prayer, "atiyo hratehajati" may calamity "be conveyed away" or "be averted."

The addition of a vowel like "u" to the words "pita" and "mata" is I should suppose a dialectic peculiarity. Similar changes occur everywhere in local dialects all over India, the syllable "ha" may possibly be a mere inflection (Conf. Lassen Prakrit Grammar, p. 399, on the Saurasenic dialect).

Or it is possible that "matuha," "pituha" may be generalizations and mean maternal and paternal relatives; as to "luota" I have already explained that its exact meaning is quite uncertain, and "atiya"\* as the supposed equivalent of the Sanscrit "atyaya." The verb I read as "hratèhajati" and would render as in the imperative or optative tenses of the passive voice of the root हृ "let it (atyaya) be conveyed away," or, "may it be conveyed away."


That this rendering is in a great measure conjectural, has been already said, and it is professedly put forward as such, and to invite criticism and correction. I would only add that in its general character, that of an invocation for the bestowing of blessings on, or the removal of evils from, friends and relatives, it accords with what appears to be the undoubted general purport of the

\* It occurs also in that part of the third line of the Wardak inscription which Rajendra Lal has left untranslated.

“Wardak” inscription, and with what seems to be the purport of the unfortunately imperfect inscription sent by Major Pearse from Eusofzye, in which the words “mata, pita” occur in conjunction.

The inscription from Bimaran, (see Thomas’s Prinsep’s essays, Vol. I. Pl. VI. and p. 105) is also a dedication of a reliquary for the prosperity (pusae) of “Sri véchitra - - - dhatra putra,” probably one at least of Col. Cunningham’s Eusofzye inscriptions has a similar meaning.

The conjectural reading, therefore, which I have ventured to submit of the present inscription, has so far additional probability, that its general object and purport is that which seems the most common in inscriptions of the same class and period.





## CORRESPONDENCE.

*Extracts from a Letter from Sir ROBERT H. SCHOMBURGK, British Consul at Bangkok, to Mr. BLYTH; latest Date, Bangkok, May 20th, 1862.*

(Various extracts from this and previous letters from Sir R. H. Schomburgk to Mr. Blyth, on Natural History topics, have been incorporated by our Curator in Reports which are still awaiting publication; and both from the present letter, and from one subsequently received from Mr. W. T. Blanford by Mr. Blyth, extracts relating to the Rhinoceroses of the Indo-Chinese region are given in p. 168 *antea*.)

Sir R. H. Schomburgk writes, from the capital of Siam:—

“ I made a short excursion in the commencement of last April. Since my return from Moulmein in April, 1860, I had not been absent from Bangkok a single day. My old enemy, rheumatism, plagued me sadly; and the Doctor advised a trip. I resolved to visit Prabat, from which place, according to the Siamese legend, Buddha stepped over to Adam’s Peak in Ceylon, leaving his foot-mark in Prabat, and impressing the print of his other foot on stepping on the Peak. Prabat is, at certain times of the year, a much frequented place of pilgrimage, which the king himself visits almost annually in great state. A gorgeous temple has been erected over the so-called foot-print, (which is in limestone—a coarse blue marble,) according to which Gaudama or Buddha must have had astoundingly large organs for ambulation. According to a fac-simile, hung against the walls of the temple (for the sacred foot-print is covered with a grating and strewed with rings and other trinkets of value), his foot measured  $5\frac{1}{2}$  ft. and where broadest 1 ft.  $10\frac{1}{2}$  in.

“ I proceeded from thence to Nookburi, an ancient residence of the Siamese kings; of the former splendour of which the Ambassadors of Louis XIV, have told us so much; but that is all gone. (*Par parenthèse*, the present king is there erecting a residence; but how inferior to what those old ruins indicate the palace must have been when in its pristine beauty!) The ruins of the house of that Greek adventurer, Faulcon, interested me much—at one time only

second to the king, he ended his career by being cruelly murdered, his patron tacitly consenting.

" I now hurried home. The cremation of the Queen Consort, who died on the 9th of September, was to take place on the 18th of April. The solemnities and ceremonies had already commenced a week previously. The king himself lit the pile—the Governors of nearly all the provinces were present, and the crowd assembled was from 15,000 to 16,000 persons—if not more. The king has since made a pilgrimage to Pechaburi to visit the cave, and he has returned. I presume we shall now fall back to our every-day life.

\* \* \* \* \*

" You have perhaps seen already in the papers a notice of the death of M. Mahout, a zealous collector of objects of Natural History, combining with it scientific knowledge. He was a Frenchman by birth, but English naturalists and friends of the science sent him to make collections in Siam, Cambodia, Tonquin, &c.: at the limits of the latter, he fell a victim to jungle-fever. His collections have been brought safely to Bangkok, and forwarded to London. His discoveries were principally grand in serpents, shells, and insects; and you must have frequently seen notices in the 'Proceedings of the Zoological Society,' &c., of what he found.

" My brother Richard, who accompanied me during the latter part of my Guiana travels, on account of the Prussian Government, and who is now settled in S. Australia, near Adelaide, has given rather an interesting account of Gould's *Leipoa ocellata*. Richard purposes to undertake a journey to the Murray district:—farming affairs, it seems, as with the majority of persons once initiated in the life of travelling in the bush, do not agree with him,—nor do they succeed in agricultural pursuits. He writes to me that during the last six months, taking only each Saturday for such a purpose, he has collected about 100 birds, 70 *Amphibia*, and 40 species of fishes. As far as I understand, from his letter, he labours for the museum at Berlin, and has the patronage of the Professors of Natural History there.

\* \* \* \* \*

" That bird so interesting to me, the *Diardigallus Crawfordii*,\* seems to belong to the Shan States. One of the Governors of those

\* *D. prælatus*, Pr. Bonap. ; *D. fasciolatus*, Bl., J. A. S. XXVII, 280.



provinces, tributary to Siam, who had been summoned on Government business to Bangkok, declared it to be a bird belonging to his district. He likewise declared that another bird, sold to me as the female, smaller in size with brown plumage, to be really the female; though the size and colour of the two are entirely different. As regards manners, however, and the peculiar cry of recognition when a person whom they know is approaching, or is to give them food, these are entirely similar. M. von Martens, the naturalist of the Prussian expedition under Count Eulanburg, was of opinion that the bird in question was the female of *D. Crawfurdi*. Still I should be glad to obtain other proofs. If this bird belongs to the northern (or rather eastern) Shan States, you, through Major Tickell or some other friend at Moulmein, will be able to procure further information. At Major Tickell's house I saw a living specimen of the bird; but the Major was absent during my visit."

*Extract from a letter from W. T. BLANFORD, Esq. (written on his voyage to Suez) to Mr. BLYTH; dated from Galle, May 30th, 1862.*

"I promised, if I could, to write you a few notes about the distribution of the Burmese animals, on my way from Calcutta to Galle. I now hurriedly jot down the more important points which struck me.

"You know that Lower Pegu is distinguished from Upper Burmá, as regards climate, pretty much as Lower Bengal differs from the Upper Gangetic plains; but in a much greater degree: Pegu being damper than Bengal; Upper Burmá dryer than the N. W. provinces. The great change takes place above our territories, and is most strongly marked after passing Mendha. But a very considerable alteration in the vegetation, and a corresponding one in the Fauna, take place at a much lower point, and are perhaps first to be noticed about Akouk-toung, a rocky promontory on the banks of the Irawádi about 30 miles below Prome. A comparatively dry region, however, stretches down the eastern flank of the Arakan hills, so far as they form a high connected range, that is—to a little below the parallel of Henzada; and of this the Fauna of the range of hills stretching to Cape Negrais is, in its principal features, essentially Arakanese, the hills being covered with dark evergreen jungle. My experience of both regions is mainly confined to the west side of the Irawádi river.

"Of the upper dry region, the most characteristic animal is perhaps a ground Thrush (*Chatarrhæa gularis*, Blyth). I have never met with this bird below Prome; nor have I ever seen it in thick or high jungle. It is entirely an inhabitant of bushes. It is common at Thayet Myo; and higher up, about Yenán-phyoung and Pugan, it far exceeds any other bird in its numbers. Your *Lepus peguensis* is also, so far as I know, confined to this dry region;\* as are also the few Jackals which occur in Burmá. I have not heard of them, however, above the frontier; but suspect they will be found there, as well as at Meaday and Prome.

"Dr. Jerdon's new species of Magpie (*Crypsirina cucullata*), and his new *Pericrocotus*,† and probably his new Mainas,‡ are other species peculiar to the dry region; none of them appearing to occur below: your *Urocissa magnirostris* I met with, near the base of the Arakan hills, as far south as the neighbourhood of Gnathem-phyoung, but no further.

"Of the damper climate of Lower Pegu, one of the most typical birds, so far at least as abundance is concerned, is the large *Buceros plicatus* (your *ruficollis*, the species with deep notches on the sides of the bill,) of Arakan.§ *Sciurus Keraudrenii* I have seen near Myansoing; but it is far more common to the south; where, also, a peculiar variety of *Sc. bicolor*, with a light patch or band on the back, is tolerably abundant. If *Sc. bicolor* exists in Upper Burmá, it must be excessively scarce.|| *Sc. assamensis* (?) is common throughout the Bassein district; and another species (*Sc.*—?) is said to occur above; but of this I am far from certain.

\* I was assured of the existence of Hares on the left bank of the Salween, above the junction of the Yunzalin river.—*Cur. As. Soc.*

† *P. albifrons*, Jerdon, *Ibis*, 1860.

‡ Major Tickell called my attention to a white-headed Maina, which, he remarked, he had only seen about Rangoon, where I sought for it in vain. It is doubtless the *Temenuchus burmesianus*, Jerdon (*loc. cit.*), obtained by him at Thayet Myo, and by Mr. Blanford in various parts of Upper Burmá. I observed, however, in Col. Phayre's compound in Rangoon, a flock of the beautiful *Ploceus hypoxanthus*, (Daudin); Dr. Jerdon obtained this bird at Thayet Myo; and Sir R. H. Schomburgk in Siam (*P. Z. S.* 1859, p. 151): it having previously been only known from Jáva and other islands of the great Eastern archipelago.—*Cur. As. Soc.*

§ The most characteristic bird of the Martaban and Tenasserim jungles is certainly *Garrulax Belangeri*, at all elevations. The Sháma (*Kittacincula macroura*) is also very abundant.—*Cur. As. Soc.*

|| It is not likely to occur in Upper Burmá, to judge from the analogy of *Sc. purpureus* of Central India, the range of which does not extend to Upper Hindustán.—*Cur. As. Soc.*



"I pointed out to you when in Calcutta the distinction between the three Kingfishers of salt-water and those of fresh-water streams and pools.\*

"The Irawádi Porpoise abounds in many parts of the river. I saw them in great numbers above Ava in the gorge below Malé, and from their extreme scarcity in Pegu during the rains, I think it by no means improbable that they migrate up the river at that season. I believe something similar has been observed in respect to the 'Susu' of the Ganges.†

\* \* \* \* \*

"Of the new birds in my collection, the Maina (*Temenuchus burmesianus*, Jerdon,) is from Thayet Myo, and will doubtless prove another of the peculiar species of the dry region. The little black and white bird (*Rhodophila melanoleuca*, Jerdon,) is from the same place. Of *Mulleripicus Heddeni*, I believe that I obtained one specimen at Thayet Myo, and subsequently I again shot it S. of Bassein. It is a very wary bird. The rare Bunting (*Emberiza rutila*, Pallas,) I found in grass on a stream, at the base of the Arakan hills near Gnathim-phyoung. The *Rhodophila* was shot in elephant-grass in the plains near Henzada.

"That is all I can think of at the moment. Of course you may insert in any way you please. The land mollusks fully bear out the separation of the two provinces, Arakan and Lower Pegu from the Upper Irawádi valley. Scarcely a species is common to the two regions."‡

\* *Halcyon amauropterus*, *H. atricapillus*, and *Alcedo meninting*, being the salt-water species noticed by Mr. Blanford, which are replaced higher up the rivers by *H. leucocephalus*, *H. fuscus*, and *A. bengalensis*. The little *Ceyx*, also, appears to be peculiar to brackish water; but I observed *H. atricapillus* about 100 miles up the river Salween.—*Cur. As. Soc.*

† The 'Porpoise' of the Irawádi has not yet been scientifically examined.—*Cur. As. Soc.*

‡ Here I may remark, that the zoology of the more distant (and more recently acquired) dry region of the Upper Irawádi has hardly, as yet, been more than commenced upon. Though I collected pretty largely both at Moulmein and in Upper Martaban, I obtained no new species of bird whatever; and only one dubiously new mammal (a *Rhizomys*) in the latter region. The same number of species collected in Upper Pegu would, doubtless, have yielded at least several novelties; and it was there that Dr. Jerdon and Mr. Blanford discovered their various new birds. I was successful, however, in procuring capital specimens of sundry desiderata.—*Cur. As. Soc.*

*A further Note on Elephants and Rhinoceroses.*

There is a notice of the wild Elephants of Borneo in Mr. Spencer St. John's 'Life in the Forests of the Far East' (1862), I, 95. This author writes—"Among our Malays was one who had frequently traded with the north-east coast [of Borneo], and the mention of *gading* (ivory) brought to his recollection that Elephants exist in the districts about the river Kina Batañgan. I have seen many tusks brought to Labuan for sale, but never measured one longer than six feet two inches, including the part set in the head.

"I have met dozens of men who have seen the Elephant there, but my own experience has been limited to finding their traces near the sea-beach. It is generally believed that above a hundred years ago the East India Company sent to the Sultan of Sulu a present of these animals; that the Sultan said, these great creatures would certainly eat up the whole produce of his little island, and asked the donors to land them at Cape Unsang, on the north-east coast of Borneo, where his people would take care of them. But it is contrary to their nature to take care of any animal that requires much trouble, so the Elephants sought their own food in the woods, and soon became wild.

"Hundreds now wander about, and constantly break into the plantations, doing much damage; but the natives sally out with huge flaming torches, and drive the startled beasts back to the woods.

"The ivory of Bornean commerce is generally produced from the dead bodies found in the forests; but there is, now living, one man who derives a profitable trade in fresh ivory. He sallies out on dark nights, with simply a waist-cloth and a short, sharp spear: he crawls up to a herd of Elephants, and, selecting a large one, drives his spear into the animal's belly. In a moment, the whole herd is on the move, frightened by the bellowing of their wounded companion, who rushes to and fro, until the panic spreads, and they tear headlong through the jungle, crushing before them all the smaller vegetation. The hunter's peril at that moment is great, but fortune has favoured him yet, as he has escaped being trampled to death.

"In the morning he follows the traces of the herd, and, carefully examining the soil, detects the spots of blood that have fallen from



the wounded Elephant. He often finds him, so weakened by loss of blood as to be unable to keep up with the rest of the herd, and a new wound is soon inflicted. Patiently pursuing this practice, the hunter has secured many of these princes of the forest."

In another place (I, 396), but again with reference to the valley of the Kina Batañgan river, Mr. St. John remarks—"As this is the only country in Borneo where the Elephants are numerous, it is the only one where ivory forms an important article of trade in the eyes of the natives."

Now, I am well aware of Mr. Darwin's calculation as to what the accumulated progeny of one pair of slow-breeding Elephants might amount to, in the course of five centuries, supposing that naught happened to check their increase in the geometrical ratio; but I doubt exceedingly that, in the instance under consideration, the existing great herds of Elephants in the N. E. peninsula of Borneo have descended from some two or three individuals put ashore by the order of the Sultan of Sulu, a little more than a century ago; continually decimated, too, as these Elephants would seem to have been and are at this time: and I doubt it all the more, because it appears that wild herds of Elephants existed until recently in Sulu! Why, therefore, should the few tame Elephants presented to the Sultan of Sulu be landed in Borneo? The remnant of the wild race existed in Sulu within the memory of people now living! On this subject, Mr. St. John fortunately helps us with information. In his notice of Sulu, he remarks (II, 243),—"Remembering Forest's statement that Elephants were found in his time in the forests which clothed so much of the soil of the island, I asked Dater Daniel about it; his answer was, that even within the remembrance of the oldest men then alive, there were still a few Elephants left in the woods, but that, finding they committed so much damage to the plantations, the villagers had combined and hunted the beasts till they were all killed: I was pleased to find the old traveller's account confirmed." II, 243.\*

\* Unfortunately, Mr. St. John is no naturalist. The little 'Mouse Deer' he calls the 'Moose Deer' (II, 52), like some of our countrymen in Ceylon; thus confounding the very smallest of the Deer tribe with the very largest; and the tiny animal of the tropics with the giant of northern regions! Of his two kinds of horned Deer (I, 33), I take the *Rusa Balum* to be the Javanese *Rusa*, and the *Rusa Lalang* to mean the Muntjac. The latter, however, is elsewhere

Why should the Elephant of Borneo have been introduced by human agency, any more than the RHINOCEROS SONDAICUS, or the BOS SONDAICUS; which latter would appear to be remarkably numerous on the vast island?

I have been assured that there is no notice of the Rhinoceros in the early Sanscrit writings; but then the river Ganges is mentioned once only in the whole course of the Vedas. Questioning Mr. E. B. Cowell on the subject, he obligingly writes word—"There are at least two Sanscrit words for Rhinoceros, *Khadga* or *Khadgin* (*Khadga* properly means 'a sword'—then the horn, and lastly the animal, —*Khadgin* means the 'sword-bearer,') and *Gandaka* (*ganda* properly means 'a cheek'). Both words are found in the *Amara Kosha* dictionary about 56 B. C., and the words *Khadgin* and *Khadga* occur in the *Mahábhárata* and *Rámáyana*. The Hindustani word is *Gaindá*; and I suspect Báber used this term, as all our Indo-Persian writers use Hindustáni terms pretty freely. There is, however, a good Persian word for it, *Karkadan*; and I find in Richardson's dictionary a new fact in Natural History which I doubt if even you have found out. I transcribe his whole account.

" 'The horn of this animal, it is said, sweats on the approach of any species of poison, for which reason many Eastern princes make use of it constantly at table; when split through the middle there is the resemblance of a man represented by white lines, together with the figures of several birds.'

" 'There are several Arabic names for the Rhinoceros, as *Mirmís*, *Hirmís*, *Karkaddan*; but these names tell nothing.' The Arabs, however, most probably obtained their knowledge of the genus from one or more of the African species. *Gondá* is the name applied in Bengal (misspelt *Gomdá* in Parsons's paper in the *Phil. Trans.*), passing into *Gorrá* in Upper Hindustân: *Kyen* or *Kyeng* is the Burmese name; and *Bádák* or *Bodok* the Malayan. *Gondá* has at least the merit of brevity over *Rhinoceros*, and is quite as *euphonous*.

With respect to the history of the skeleton of RH. SONDAICUS in the Society's museum, *vide J. A. S.* III, 142, IX, 518, X, 928. The

mentioned by him by its name of *Kijang*. So familiar a bird (in museums at least) as a Trogon, he does not know by that name, but terms it the 'Omen-bird' (II, 62, 67, 95); and the remarkable wild Boar of Borneo (*SUS BARBATUS*) he fails to recognise as a peculiar species. The BOS SONDAICUS would appear to be very common in the part of Borneo traversed by Mr. St. John, and he designates it by the name *Tambadau*.



animal was shot by Sir J. Barlow, Bt., (then Mr. Barlow,) in the Jessore district, and his people brought the carcass to Calcutta by Tolly's nullá. It was conveyed to the Mint, and was there prepared as a skeleton by Mr. W. E. Templeton (subsequently employed as a taxidérmist by the Society) for the late James Prinsep, who afterwards presented it in the name of Mr. Barlow for the Society's museum.\*

Báber's account of the Rhinoceros, as given in Mr. Erskine's translation, is as follows :—

In his notice of the “ animals peculiar to Hindustân, after describing the Elephant, he remarks—

“ The Rhinoceros is another. This also is a huge animal. Its bulk is equal to that of three Buffaloes. The opinion prevalent in our countries, that a Rhinoceros can lift an Elephant on its horn, is probably a mistake. It has a single horn over its nose, upwards of a span in length ; but I never saw one of two spans. Out of one of the largest of these horns I had a drinking-vessel made and a dice-box, and about three or four fingers' bulk of it might be left. Its hide is very thick. If it be shot at with a powerful bow, drawn up to the arm-pit with much force, and if the arrow pierces at all, it enters only three or four fingers' breadth. They say, however, that there are parts of his skin that may be pierced and the arrows enter deep. On the sides of its two shoulder-blades, and of its two thighs, are folds that hang loose, and appear at a distance like cloth-housings dangling over it. It bears more resemblance to the Horse than to any other animal. As the Horse has a large stomach, so has this ;† as the pastern of a Horse is composed of a single bone, so also is that of the Rhinoceros. It is more ferocious than the Elephant, and cannot be rendered so tame or obedient. There are numbers of them in the jungles of Peshâwer and Hashnagar, as well as between the river Sind and Behreh in the jungles. In Hindustân, too, they abound on the banks of the river Sirwû. In the course of my expeditions into Hindustân, in the jungles of Peshâwer and Hashnagar, I frequently killed the Rhinoceros. It strikes powerfully with its horn, with which, in the course of these hunts, many men, and many horses,

\* I find that, in the Catalogue of the mammalia in the India House Museum (p. 195), the *habitat* of *RH. SONDAICUS* is set down as “ Java exclusively !”

† Linnæus remarks—“ *Viscera ad equina accedunt.*”

were gored. In one hunt, it tossed with its horn, a full spear's length, the horse of a young man named Maksûd, whence he got the name of Rhinoceros Maksûd."\*

Again, in the course of his narrative, he states—

"We continued our march till we came near Bekrâm and then halted. Next morning we continued halting in the same station, and I went out to hunt the Rhinoceros.

"We crossed the Siâh-Ab, in front of Bekrâm, and formed our ring lower down the river. When we had gone a short way, a man came after us with notice, that a Rhinoceros had entered a little wood near Bekrâm, and that they had surrounded the wood, and were waiting for us. We immediately proceeded towards the wood at full gallop, and cast a ring round it. Instantly on our raising the shout, the Rhinoceros issued out into the plain, and took to flight. Hûmâiûn, and those who had come from the same quarter, never having seen a Rhinoceros before, were greatly amused. They followed it for nearly a kos, shot many arrows at it, and finally brought it down. This Rhinoceros did not make a good set at any person, or any horse. They afterwards killed another Rhinoceros. I had often amused myself with conjecturing how an Elephant and Rhinoceros would behave if brought to face each other; on this occasion the elephant-keepers brought out the Elephants, so that one Elephant fell right in with the Rhinoceros. As soon as the elephant-drivers put their beasts in motion, the Rhinoceros would not come up, but immediately ran off in another direction."

The description which Báber gives of a mailed single-horned Rhinoceros is unmistakeable; but it still seems passing strange that these huge *pachyderms* should have been killed with arrows.

E. BLYTH.

\* Some of Báber's observations are amusingly correct. Thus, of the common large Indian Frogs (*RANA TIGRINA*), he remarks—"The Frogs of Hindustân are worthy of notice. Though of the same species as [*i. e.* akin to] our own, yet they will run six or seven *guz* [twelve or fourteen feet] on the face of the water." I have known more than one European naturalist-traveller to have been at once struck with this peculiarity.

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## LITERARY INTELLIGENCE.

The following extract on the geographical knowledge of the nations of Islám, is from a letter received by Babu Rajendralal Mitra from Professor Rafn of Copenhagen.

“*The Royal Society of Northern Antiquaries* in Copenhagen has published a new volume of its *Annals of Northern Archæology and History*. This volume for 1857 opens with a voluminous and instructive historical and geographical enquiry by A. F. Mehren ‘on the general geographical knowledge possessed by the Islamitic nations, particularly with respect to the northern and southern coasts of the hemisphere known to them.’

“The distinguished French Professor Reinaud, and the illustrious geographers Malte Brun and Lelewel have particularly directed our attention to the merits of the Arabs in geographical study. The present treatise is a continuation of the labours of these and other scholars.

“We have first a critical sketch of the most important Mohammedan Geographers from the 8th to the 16th century according to our era. We have next separate chapters on the oldest unscientific ideas of the Arabians on the Universe, their conceptions of the form of the earth, their mathematical division of the earth, their measurement of the degrees, and the division of the habitable globe into seven regions or climates. Another chapter treats at length of the terrestrial system of seas, the limitation of the earth by the ocean and the parts of the latter: the Southern Ocean with its coasts and islands, and the several seas connected therewith, the Eastern Ocean, the Western Ocean and its connected seas, the Mediterranean with the Black Sea and the Caspian, the isles in the Western Ocean and the coasts of the same, the Northern lands, known to the Arabs, surrounding the Varenge Sea.

“Among the many local names here mentioned as occurring in the works of the Arabian geographers, there is one of especial interest. It affords a supplement to Rafn’s ‘*Antiquitates Americanæ*’ published by the Society in 1837. The result of the geographical inquiries in this work on the situation of the Northmen’s Helluland (Newfoundland), Markland (Nova Scotia) and Vinland (New England) has

been taken up with full approval by Alexander Humboldt in his *Kosmos*. A more southern land the Northmen named Hvitramanaland (the land of the White Men) or Irland it Mikla (Great Ireland). This was supposed by Rafn to be North and South Carolina, Georgia and Florida. The oldest historian of Iceland, Are Frode, states that his stam-father Are Marson came to this land about the year 983, and was baptized there. This same land, Irland it Mikla, Irlandeh el Kabirah, is also mentioned by an Arabian geographer of the 12th century, *Abû-Abdallah Mohammed Edrisi*, who was born in Ceuta in 1099, and had studied in Cordova. He drew up his work at the desire of Roger II. King of Sicily (1130—1154.) The above geographical name as well as several other notices of the North, were doubtless derived by the Arabian author from his intercourse with the North men at the court of this sovereign in Palermo.

“It is most interesting to follow the often highly successful identification of the local names mentioned by the Arabian geographers, especially those of several islands in the Western Ocean, places in France and England, and also in Scandinavia, particularly Denmark, where Slesvig is mentioned in a curious manner, and also in Sweden. The same thing applies to Russia. An extract from a voyage in the 12th century (1132) by *Abû Abdallah Hamid* of Granada, gives an undoubted description of a Whale-fishery on the coast of the Arctic Ocean near the land Wisu. This, according to the admirable explanation of Frähn, is the tribe Wes, spoken of in the Russian Annals, north of Novgorod by the White Lake (Bielo Osero.)”

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The following is an extract from a letter to the President from Dr. Sprenger, dated June 30th.

“You are probably aware that Wöpke is going to publish the *Tárikh al Hind* of Byrúny, of which Reinaud has inserted some extracts in his work on India. It is a most extraordinary work and proves that the author had a complete knowledge of Sanscrit literature. Wöpke is an excellent Mathematician, and a good Arabic Scholar, and he has made considerable progress in Sanscrit. He began the study of this language on purpose to master Byrúny. Wüstenfeld intends to bring out the great work of Yáqút (ياقوت) on geography.”

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## NOTICES OF BOOKS CONNECTED WITH SANSKRIT LITERATURE.

*The Kumāra-Sambhava, eighth canto, with a commentary by Prema Chandra Tarkabāgīs'a. Calcutta, 1862.*

It is generally believed that only seven cantos of the Kumāra-Sambhava are extant, and some have said that Kālidāsa died before he finished the work. Few European scholars are aware that the whole of the work exists in seventeen adhyāyas,\* but whether it really belongs to Kālidāsa or not is a question which remains for future criticism to determine. The Professor of Rhetoric in the Sanskrit College has just published an edition of the eighth canto, the first of these doubtful sections, and he promises in the preface, that, should his labour be approved, he will publish the remainder in the same manner.

The present canto describes the loves of S'iva and Pārvatī, but in a manner which befits mortals alone ; and hence perhaps the oblivion into which the poem has fallen, as it violates a direct canon of Hindu criticism.† Although, however, some of the opening verses, from their indelicacy, do not deserve to be published, this by no means applies to the greater part of the canto, which is chiefly occupied with a very full description of the phenomena of evening and moonlight on the Gandhamādana mountains. Many of the verses are very beautiful, and as they have never before been published, we add a few of those which seemed to us most worthy of being ascribed to Kālidāsa.

“See! the declining sun, as it hangs on the edge of the western quarter of the sky, seems to make with its long reflected beams a golden bridge across the lake.”‡

\* There is a MS. of it in the Sanskrit College Library, and Dr. Aufrecht gives an account of two MSS. in his Bodleian Catalogue. The last book ends with the destruction of the demon Tāraka, as foreshadowed in the second book.

† This is probably alluded to in Sāhitya D. vii. p. 233 ; “yathā vā kumāra-sambhava, uttamadevatayoh pārvatī parames'warayoh sambhogas'ringāravarṇanam. Idam pitroh sambhogavarṇanam ivātyantam anuchitam, ityāhuh.”

‡ पश्य पश्चिमदिगन्तलम्बिना निर्मितं मितरुचा विवस्वता ।  
दोर्घया प्रतिस्रया सरोऽम्बसां तापमोर्धमिव सेतुबन्धनं ॥

We might almost compare these lines with the well-known passage of Moore.

“And as I watch the line of light that plays  
Far o’er the hushed wave toward the gleaming west,  
I long to tread that golden path of rays  
And think ’twill lead to some bright isle of rest.”

“Yonder setting sun, bearing the day with him, plunges into the ocean, and the horses of his chariot bend down their necks, their eyes touched by the chowries in their ears and their manes pressed down by the yoke.”\*

This description of the westering sun driving “his downward team” amplifies the idea in Ovid’s lines,

“Pronus erat Titan, inclinatoque tenebat  
Hesperium temone fretum.”

“The western horizon wears a streak of the evening red, all the rest of the sunshine being gone, as a battle-field displays a bloody scimeter uplifted aslant.”†

“Yonder moon, O fairfaced one, is united to its constellation with trembling light, as a bridegroom with his newly-won bride still trembling with fear at her new lord.”‡

We do not remember to have ever seen before in Hindu poetry an allusion to the phenomenon of *the rainbow* over a waterfall, such as we find in the following lines.

“As the sun sinks, destroying the connection of his rays with the waterdrops, the cataracts of thy father Himālaya lose their rainbow-halo.”§

It would be premature to pass a definite judgment on the authorship of the poem, until we have seen some of the other cantos. Dr. Aufrecht, in his Catalogue, has passed an unfavourable report on them, “hi

\* सोऽयमानतशिरोधरैर्हृदैः कर्णचामरविघट्टितेक्षणैः ।

अस्तमेति युगभृगुकेसरैः सन्निधाय दिवसं महोदधौ ॥

† सान्ध्यमस्तमितशेषमातपं रक्तलेखमपरा विभर्ति दिक् ।

सम्परायवसुधा सशोणितं मण्डलाग्रमिव तिर्यगुत्थितं ॥

‡ एष चारुमुखि योग्यतारया यज्यते तरलविम्बया शशी ।

साध्वसादुपगतप्रकम्पया कन्ययव नवदौक्षया वरः ॥

§ शीकरव्यतिकरं मरीचिभिर्दूरयत्यवनते विवस्वति ।

इन्द्रचापपरिवेशशून्यतां निर्भरास्तव पितुर्व्रजन्यसौ ॥



libri utrum à Kálidásâ profecti sint necne, in præsentiâ quidem dijudicare incautum esset; quæ equidem legi, mirum in modum frigere mihi videbantur;" but certainly though some verses in this eighth canto are unworthy of Kálidása, many would do him no discredit.

In conclusion we may add that there are several allusions to this eighth canto in Hindu literature. Thus the Sáhitya Darpaṇa (Book iii. §. 218), in its account of *mána* or '*amantium iræ*,' refers as its example to Párvatí's displeasure at the description of the evening by S'iva, and his wish to perform the evening rites, and quotes it as from the Kumára-Sambhava. The Das'a Rúpa in book iv. §. 12, quotes anonymously the lines beginning—

एवमालि निगृहीतसाध्वसं ।

which are the fifth S'loka of the present edition. But the most important reference is one in the second book of the Sankshipta Sára, which, in its account of námadhátus, gives the following sūtra and commentary.

दूराद् वा ॥ दूरयति दूयति । दूरयत्यवनते विवस्वतीति कालिदासः.

This is important as not only quoting a verse of the eighth canto (s'l. 31,) but as mentioning the poet's name.

E. B. C.

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Since writing the above we have learned that Dr. Bhau Dájí is printing these cantos of Kálidása in Bombay. He has succeeded in finding Mallinátha's Commentary to the eighth.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR APRIL, 1862.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on the 2nd instant.

A. Grote, Esq., President, in the chair.

Presentations were received :—

1. From Dr. Hunter, under instructions from His Excellency Sir W. Denison, a set of Capt. Tripe's photographs of Tanjore, Trivady, Madura, Poodoocottah, Trichinopoly, Rya Kotta and Seringham, of an inscription around the basement of the Binanum of the Great Pagoda at Tanjore, and of the Elliot marbles and other objects in the Madras Central Museum.
2. From Mr. C. Metcalfe, an inscribed slab from Rajshahi recording a grant of land made by Vijaya Sena, a monarch of the Sena dynasty of Bengal.
3. From Capt. E. Smyth, skins of a yak, a thar, a burral and a musk deer.
4. From Major Anstruther Thomson, a young cuttle fish in spirit.
5. From Capt. F. W. Stubbs, a small silver coin of Alexander the Great.

With reference to this coin the following note was communicated by Mr. E. C. Bayley :—

“No small coin of Alexander the Great so minute as the present has as yet been certainly found in India. Coins of the same size, however, of the Bactrian kings Demetrius and Eukratides are not uncommon. I am inclined to think the present type was struck in Alexander's Eastern possessions.”



6. From Major S. R. Tickell, a specimen of a Turtle, (*Sphargis Coriacea*).

7. From Mr. Becket, Gurhwal, a collection of specimens of birds consisting of Tibetan Gallinaceæ.

8. From Mrs. Major Turnbull, two stuffed squirrels.

9. From Major J. L. Sherwill, several boxes of specimens of coal, limestone, and minerals from Pundeeni mountain in the Manbhoom district.

10. From Mrs. Brandis, two bird skins.

11. From J. G. Thompson, Esq., two bird skins.

A rare silver coin of Altumsh, found in re-excavating a tank at Kandi in the Moorshedabad district, lent by Babu Gour Doss Bysack, was exhibited; in reference to which Mr. Bayley communicated the following remarks:—

“The coin is curious, for it gives the Khalif’s name wrong, *i. e.* *Mostanser be amr illah* instead of *Mostanser billah*, and it is also curious as wrong, the word for the denomination of the coin *al sika* not *al dirhem* as is usual. I have never I think met “*al sika*,” save on a later gold coin. The date is A. H. 680.

The following notice was submitted on the part of the Council:—

The Council beg to notify that they propose, for the consideration of the Society, the following additions and amendments in the Code of Bye-Laws:—

1. To amend Rule 43 by the insertion of the words “unless originated by the Council” after the word “then” in line 5.

2. To add the following clauses to Rule 46:—

The Council shall have the power of appointing any other day not later than that day fortnight for the Annual Meeting.

After the termination of the regular business of the Annual Meeting, the Meeting may be considered an ordinary general meeting.

3. To omit clause 1 of Rule 60 which provides that the names of the visitors allowed to be present at the meeting shall be read aloud by the chairman.

Ordered that the amendments, &c., be referred to the Council for report, in accordance with the provisions of Rule 43.

Mr. Oldham gave notice that he should move at the next meeting that the following clauses should be added after Rules 78 and 86 respectively:

One Vice-President and three members of the Council shall be changed annually.

The office of President shall not be held by the same person for more than two years in succession, but after the lapse of one year, the same person shall be re-eligible.

Ordered that these amendments be also referred to the Council for report at the next meeting.

The Council reported for confirmation that they had raised the wages of the younger Swaries, taxidermist, from Rs. 20 to Rs. 30, and of Nicholas from Rs. 6 to Rs. 10.

Approved.

They also reported that they had appointed Col. R. Strachey a member of their body in the room of Col. Yule, who had left India.

The following gentlemen duly proposed at the last meeting were balloted for and elected ordinary members :

C. U. Aitchison, Esq., C. S.

F. A. E. Dalrymple, Esq., C. S.

Lieut.-Col. H. W. Norman, C. B.

Babu Rajkissen Roy, Zemindar of Berhampore.

J. A. P. Collis, Esq., M. D.

E. G. Glazier, Esq., C. S.

Major H. Raban, Bengal Army.

The following gentlemen were named for ballot as ordinary members at the next meeting.

Babu Dhunpati Singh Dooghur, Baloochur, Moorshedabad,—proposed by Babu Gour Doss Bysack, seconded by Mr. Atkinson.

S. B. Partridge, Esq., M. D., Officiating Principal of the Medical College,—proposed by Dr. Fayrer, seconded by Mr. Atkinson.

A letter from Mr. H. Stainforth, desiring to withdraw from the Society was recorded.

Communications were received.

1. From Major S. R. Tickell, a description of a turtle *Sphargis Coriacea*.

2. From Babu Goopeenath Sein, Abstracts of Meteorological Observations, taken at the Surveyor General's Office in the month of October last.

3. From Major J. L. Sherwill, Revenue Surveyor, a letter to the President on the subject of the Manbhoom coal fields.



4. From Major J. L. Sherwill, an account of a visit to Kunch-injinga.

Dr. Simpson read this paper to the meeting, and exhibited some photographic views of places mentioned in it.

The paper will appear in one of the forthcoming numbers of the journal.

Captain Montgomerie presented to the Society a memorandum on the geographical positions of the principal cities and towns of Eastern Turkistan, and exhibited a photograph by Lieutenant Melville from the field sheets of the Kashmir series, shewing the glaciers of the Shigar valley on a scale of four miles to an inch.

After explaining that the positions in Turkistan were derived entirely from Great Trigonometrical Survey data and materials collected on the Hindustan side of the Mustak and Karakorum passes, Captain Montgomerie proceeded to read some notes on the Brahma, Kun and Nun, Zanskar, Mustak and other glaciers.

He pointed out that as he had anticipated in his former memorandum, these glaciers have proved to be of the most gigantic size, so large, indeed, that compared with them the glaciers of the Alps must be reckoned as of the second order.

The glaciers surveyed by Capt. Montgomerie's party may be divided into those of the Himalayan and Mustak water-sheds. The glaciers of the Himalayan water-shed can boast of a large number varying in length from five to fifteen miles, the largest being the Drung-Drung glacier of fifteen miles, and there are others over eleven miles in Zanskar, the Brahma glacier of eleven and a half miles in Wurdwun and the Purkutsi glacier of seven and a half miles in Sooroo, besides a multitude of minor glaciers. The Purkutsi gunri or glacier is perhaps the most remarkable of the whole of this group, as it comes tumbling down in a torrent of broken and pinnacled ice from near the summit of the Kún peak which rises upwards of 23,000 feet above the sea, a sight well worth looking at, though in actual length the glacier is somewhat inferior to others in the neighbourhood; it makes up for the want of length by the large mass of ice that is visible from one spot.

The next group of glaciers referred to by Captain Montgomerie was that of the Mustak, consisting of those in the Saltoro and Hushe valley around the splendid peaks of Mashabrum, and his neighbours

which rise to upwards of 26,000 feet above the sea. The most remarkable glaciers in the Saltoro valley, taking them from east to west, are the Sherpogong glacier 16 miles and the Koondoos 24 miles in length; in the Hushe valley the Naug glacier 14 miles in length and the Atosir glaciers 13 and 11 miles in length.

The next group referred to was that of the Mustak on the Bráldo and Báshá branches of the Shigar river. The Bráldo boasting of the Baltoro glacier no less than 36 miles in length, with a breadth of from 1 to  $2\frac{1}{2}$  miles; the Punmah and Nobundi Sobundi glaciers, the longest, of which is 28 miles in length and the Biafo gáusè or glacier with a direct length of 33 miles without reckoning its upper branches. The Biafo gause forms, with a glacier on the opposite slope towards Miggair, a continuous river of ice of 64 miles running in an almost straight line, and without any break in its continuity beyond those of the ordinary crevasses of glaciers.

The Biafo glacier is supplied in a great measure from a vast dome of ice and snow about 180 square miles in area, in the whole of which only a few projecting points of wall are visible.

Further west the Hoh valley produces a fine glacier 16 miles in length.

The Báshá valley contains the Kero glacier 11 miles in length, the Chogo glacier 29 miles in length, besides, many branches and minor glaciers. The Braldo and Basha, in fact, contain such a galaxy of glaciers as can be shewn in no other part of the globe, except it be within the Arctic circle.

Captain Montgomerie pointed out that the Baltoro, with its main glacier 36 miles in length and its 14 large tributary glaciers of from 3 to 10 miles in length, would form a study in itself, and give employment for several summers before it could be properly examined. The small photograph of the Baltoro glacier (taken from a sketch by Captain Austen) shews at a glance the wonderful number of gigantic moraines which streak the Baltoro glacier with 15 lines of various kinds of rock, viz., grey, yellow, brown, blue, and red, with variations of the same, all in the upper part quite separate from one another, but at the end of the glacier covering its whole surface so as to hide the upper part of the ice entirely. In the centre of these moraines there was a line of huge blocks of ice which had not been observed on other glaciers, and which it is difficult to account for. The Baltoro



glacier takes its rise from underneath a peak 28,287 feet high. Captain Montgomerie was in a considerable state of alarm at one time lest this noble peak should turn out to be in Turkistan. Captain Austen has, however, removed all anxiety on that score, as one side of the peak at any rate is in Her Majesty's dominions.

Captain Montgomerie noticed that all glacier phenomena were to be found on a gigantic scale in the Shigar valley. The crevasses in the ice were of great breadth and of the most formidable description. An attempt was made to measure the thickness of the ice by sounding one of these yawning chasms, but a line of 160 feet in length failed to reach the bottom of it. Observations made at the end of the glaciers gave a thickness of 300 or 400 feet, but doubtless higher up a still greater thickness of ice will be found.

The surface ice was regularly drained by streamers with large lakes of a-half to two miles in length, the whole water occasionally disappearing down great holes or "moulins" in the ice with a loud intermittent roaring noise.

The glaciers being on such a gigantic scale, it, of course, took days and days to explore one of them. In the smaller glaciers no particular precautions had to be taken, but in the Shigar valley it was absolutely necessary to tie all the men of the party together with rope, giving about ten yards between each so as to save any one who might slip into a crevasse. Implements for cutting ice were in constant requisition and altogether it was a service of considerable danger exploring the larger glaciers.

The exposure involved in such explorations is evident from the number of days for which it was necessary to encamp on the ice at a great elevation with a limited supply of food and fuel which had to be carried for the whole trip. The economy necessary in fuel was more especially trying to Captain Austen and his party.

Captain Austen made the detailed survey of the Shigar valley and its vast glaciers. Lieutenant Melville did the same for the glaciers of the Sooroo, Zanskar and Butuai, Mr. Ryall those of the Saltoro valley; Mr. Todd those of the Brahma group. Captain Montgomerie considers that to all of them (and more especially to Captain Austen) the greatest praise is due for their untiring devotion to a most arduous and trying task, and for the skill with which they have accomplished it.

A vast field for exploration having been thus opened out by the Kashmir series, Captain Montgomerie hoped that the Journal of the Society would hereafter be filled with a mass of interesting detail regarding these glaciers. Should any Alpine explorers from England be tempted to visit this interesting field of research, Captain Montgomerie promises them glaciers and mountains worthy of their exertions, and he added that the officers of the Trigonometrical Survey would be prepared to supply every assistance in the way of data as a basis for more minute inquiries.

He reiterated that, as compared with the Shigar glaciers, those of the Alps may be considered of the second order, the best known one—the Mer De Glace—being about 7 miles in length and the largest, the Aletsch glacier being a little over 15 miles in length, whilst the larger ones surveyed by the Kashmir Series on the Braldo, &c., varied between 15 and 36 miles in length.

Captain Montgomerie concluded by saying that he hoped hereafter, when next summer's researches were finished, to draw up a more complete account of these magnificent glaciers. Meantime he trusted that the rough notes which he had hurriedly put together would give a general idea of their vast extent and of the importance of their addition to our knowledge of the physical geography of the globe.

Captain Montgomerie subsequently spoke as to the advisability of employing native agency for the purpose of adding to our knowledge of Central Asia and other countries. He thought that natives of the north of India might be trained to take latitude observations and to make rough route surveys. The work of such natives would be tested in ground already explored by Europeans, and numerous other precautions might be taken to insure accuracy. Explorations in Central Asia had hitherto been most dangerous to Europeans, but natives of Hindostan went there constantly and returned in safety. For instance, the Commissioner of Peshawur had lately sent the Moola Abdul Mujeed from Peshawur *viâ* Cabul, Kundooz, Badakshan, and across the steppe of Pamir down to Kokan with a letter and presents from His Excellency the Governor-General to the Khan. The Moola returned in safety, and beyond the physical difficulties, such as crossing the plains of Pamir then covered with snow, he had no interruption, and if he had been able he could have taken latitude observations and made a rough route survey without any danger.



The Jesuits in China had succeeded in collecting geographical materials by means of the Chinese trained by themselves, which have subsequently been proved to be good, and Captain Montgomerie did not see why the English should not get at least as good work out of some of the natives of Hindostan. Captain Montgomerie recommended the subject to the consideration of the Council of the Society, and he was prepared to draw up a project for employing natives in exploration if the Council thought it advisable.

Thanks were voted to Captain Montgomerie for his interesting communication.

The Librarian submitted the usual monthly report.

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The following is a list of books &c. added to the Library since the Meeting in March.

*Presented.*

Vividhartha Sangraha, No. 79.—BY THE EDITOR.

Calcutta Christian Intelligencer for 1861.—BY THE RIGHT REV. THE BISHOP OF CALCUTTA.

The Oriental Baptist for March.—BY THE EDITOR.

The Oriental Christian Spectator for January.—BY THE EDITOR.

Selections from the Records of the Government of the N. W. Provinces, No. 35.—BY THE GOVERNMENT N. W. PROVINCES.

Photographs of the Elliott Marbles and other subjects in the Central Museum, Madras. By Capt. Tripe.—BY THE MADRAS GOVERNMENT.

Photographic Views in Tanjore and Trivady.—BY THE SAME.

Ditto Ditto of Seringham, Trichinopoly, Poodoocottah, Ryakottah and other places in the Saleim District.—BY THE SAME.

Ditto Ditto in Madura District, Parts 1, 2, 3 and 4.—BY THE SAME.

Ditto Ditto of an Inscription around the basement of the Bimanum of the Great Pagoda at Tanjore.—BY THE SAME.

LA'LGOPA'L DUTT.

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JOURNAL  
OF THE  
ASIATIC SOCIETY.

No. III. 1862.

*Account of a visit to Puppá dOUNG, an extinct volcano in Upper Burma.*—By WILLIAM T. BLANFORD, F. G. S.

The isolated peak of Puppá\* dOUNG (more commonly but incorrectly written Paopa dOUNG) must have attracted the attention of every one who has passed along the Irawaddi valley between Yenán-khyoung and Minkhyán. For some distance below and above Pagán, especially, it is a most conspicuous object, and there is certainly no hill seen from the Irawaddi between Rangoon and Ava, nor perhaps until the Shwé-ú-toung is seen from Malé, which forms an equally striking feature in the varying and picturesque landscape of the river valley. This is not because Puppá is much higher than other mountains seen from the river, many of the more lofty portions of the Arakan Yoma must nearly equal it in elevation, but they are far less prominent, because they only rise slightly above the remainder of the range, the general contour of which is rounded and uninteresting; while Puppá stands completely alone, its steep sides and craggy top, the latter frequently capped with clouds, towering majestically over the low ridges of sandstone sparsely scattered over the country in its neighbourhood. From the difficulty of access to the interior of upper Burma, except in the immediate neighbourhood of the river Irawaddi below the capital, Puppá has, so far as I am aware, never been reached by any European; and, therefore, although my visit was most hasty, a short account of it may prove interesting, by

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shewing that the claims of this fine peak to notice are by no means limited to its picturesque appearance,\* and that both its geology and natural history deserve far more attention than I was able to devote to them in the two days to which my stay was necessarily limited.

Towards the end of last October, I was on my return from Mandele, the present capital of Ava, in which town and its neighbourhood I had been staying for about six weeks. Before leaving the city I had been furnished with an order of the king, addressed to the Myo-woon or Governor of Pagán, to assist me in every way. Without such an order, it would, in all probability, be very difficult for any one to visit the mountain,† and it would certainly have been impossible for me, within the few days of my leave which remained unexpired. As it was, I had not the slightest delay, but, reaching Pagán on the afternoon of the 25th October, I was able to start for Puppá the next morning, the Myo-woon sending with me a *Tsare* or writer, and providing me with a pony, coolies and guides.

The distance of Puppá in a direct line from Pagán can be but little over twenty-five miles, but by the road, which winds considerably, this is increased to thirty or thirty-five, about two days' march. The accompanying map is a mere sketch, but it will serve to shew the relative positions of the various places mentioned below.

*October 26th.*—I left Pagán by a road which passed close to the Dhamayangyee temple, and thence led, by no means in a direct line, towards the N. W. end of the Ta-ywan (or Ta-rwan) hills.‡ Near the town, the country is mostly cultivated at this season, the principal crops being maize *janera*, and a kind of millet called *lú* by the Burmese. The soil is very sandy, but few pebbles occurring. The whole of the slightly undulating tract, over which I passed from

\* Major (now Colonel) Yule in the excellent "Narrative of the Mission to Ava," thus writes (p. 25, London edition). "The lofty isolated hill of Paopa was distinctly visible far to the Eastward, showing here a double himmock top. It must be 3000 feet high, at least allowing for the probable distance." And again p. 27. "The remarkable Paopa dounq is a more and more conspicuous object as we advance. The Burmese naturally look with some superstitious dread on this isolated mountain which they say it is impossible to ascend, and regard as the dwelling of myriads of Nats and Bilus. See also Dr. Oldham's note in the appendix to the same work, p. 338." Others, besides Col. Yule, have been told by the Burmese that the mountain is inaccessible.

† In this and in other instances in which I was allowed to penetrate into the country above Ava, I was indebted, for this advantage, to Colonel Phayre, the Commissioner of Pegu, who very kindly furnished me with a letter to the chief minister at Mandele.

‡ Tharawadi hills of Col. Yule. Narrative, p. 27.



Pagán to the foot of Puppá, is composed of the series of sands and gravels, with occasional conglomerate beds, which occupies so large a portion of the valley of the Irawaddi between Ava and Prome, and sections of which abound on the river banks between Pagán and Meulhá, especially in the neighbourhood of Yénánkhyoung. Many details concerning them will be found in Dr. Oldham's notes on the geological features of the banks of the Irawaddi, published as an appendix to Col. Yule's "Narrative." In these beds, bones of Mastodon, Elephant, Rhinoceros, Bos and other ruminants, Tortoise, Crocodile, &c., occur in several places, as at Yénánkhyoung, Pakhángé, in the Yau country west of Pagán, &c., and they contain the silicified fossil wood, the abundance of which in this portion of Burma is so remarkable. About Pagán, and to the E. and N. E. of the town, the country occupied by these rocks is less intersected by ravines than is the case further south, and from the undulating plain which slopes gradually and gently upwards from the river, the outcrops of the harder nummulitic beds, which underlie the more recent sands, project, here and there, in the form of straight steep ridges of sandstone of no great height. One of the most prominent of these is the Taywan doun, which stretches for eight or ten miles in a nearly straight line from N. 20 W. to S. 20 E., the dip of the beds being at an angle of about  $40^{\circ}$  to W. 20 S.

I climbed to the Pagoda at the N. W. end of the range for the purpose of obtaining a few bearings, and from this point I had the first good view of Puppá. From some delay in starting, and a halt about midday for breakfast, together with a few eccentricities on the part of my guide, it was by this time afternoon, and the sun had sunk considerably, so that it shone from behind me upon the mountain. Dr. Oldham, who also saw Puppá from this spot, suggested that it might be formed of metamorphic rocks, like the mountains E. of Ava, and its appearance produced precisely the same impression upon me, although I could see distinctly, even at this distance, that the highest part of the mountain did not consist of a straight ridge, but of a semicircular one, surrounding a central hollow, which suggested a volcanic origin. But such an appearance is not rare in high peaks of gneiss or schistose rocks. There is one remarkable instance in Beerbhoom, about thirty miles S. of Deogurh, in a hill called Patardha.

From Taywan dounq, I could also see distinctly that all the upper portion of the peak was free from jungle and covered with grass, a circumstance which suggested sufficient elevation to produce an alteration of the climate at the top.

The road led along the E. side of the Taywan hills, for several miles, to a place called Káma, where I found some wooden charpoys arranged under a shed for our accommodation. The village, like all others which I saw on the road, was a very poor one of about twenty houses, which are built differently from any that I have before met with in Burma, there being no flooring of bamboos or planks raised above the ground. The earth here, as in India, forms the floor, the skeleton of the house is built as usual of wood and the sides and roof closed in with palmyra leaves. Toungwen and Kwébyo were rather larger than Káma. All these villages obtain their water from tanks, which are of small size, and must frequently dry up in the hot weather. Wells, in this sandy region, would probably require to be dug to a depth far exceeding Burmese capabilities, and the broad torrent beds, which abound, never contain water except immediately after very heavy rain.

*October 27th.*—The road from Káma led for some distance nearly due East to a village called Kwé-byo. The country between this and the Taywan hills is only cultivated in patches, the greater portion being covered with a thin jungle,\* composed almost entirely of the cutch tree, (*acacia catechu*), the jujube plum, (*zizyphus*), and the zhi phyu or amra, (*Phyllanthus*, I believe,) the acid fruits of which are as much relished by the Burmese as by the natives of India. The *Euphorbia*, which abounds near the river's bank, is comparatively scarce a short distance inland.

After passing Kwé-byo, the jungle became thicker and more varied, resembling the thinner jungles of Bengal and Orissa, the soil also became more gravelly and ferruginous. Wild animals are said to be very scarce, the only kinds which are found being the barking deer and the tha-meng (*Panolia*) and leopards. Hares (*Lepus Peguensis*) abound however. I here first saw some of the furnaces in which the

\* There is a great resemblance between this country and some parts of Southern India. The scenery between Pagán and Kwé-byo recalled to me that between Trichinopoly and the Nilgiris, especially from Caroor to the base of the hills. The resemblance is increased by the thorn fences round all the fields and patches of cultivation.





H.L. Frazer Lith:

PUPPA HILL BURMAH,  
*from the West.*

Calcutta, 1862.







famous Puppá iron is produced. They are not worked at this season of the year, when the population is employed in agriculture. In form they differ entirely from any Indian furnace with which I am acquainted, and they are, so far as I am aware, quite peculiar in producing iron without the use of any artificial blast whatever. The iron obtained, although extremely impure, being mixed with slag and pieces of unburnt charcoal, is in large blocks and of excellent quality, and from this district, that is the country around Puppá, a very large proportion of the iron used in Burma is obtained.

The whole road so far had been a slow but constant ascent from the Irawaddi, but on reaching the village of Endothá a watershed was passed, and a valley lay between it and the mountain, the base of which was now only about five miles distant. The view from this point is perhaps the best on the whole road, and the mountain, its lower portion covered with dense jungle, and the bright grassy outer slopes of the top contrasting with the black precipices of the interior, has a most imposing appearance. Yet it loses much of its height from the elevation of the ground around.\* The crater form, which had been gradually becoming more distinct as I approached, was now so remarkable as to leave little doubt of the mountain's being of volcanic origin. To the South was the singular hill of Tounngalá, a peculiar mass in the shape of a truncated cone with very steep sides. It is referred to by Dr. Oldham. Another peculiarity, which here came into view, was a raised terrace-like expanse of flat ground, apparently encircling the mountain and separated from the undulating sandy country around by a precipitous scarp about 500 feet high, which stretched for many miles, forming the opposite side of the hollow in front of me. My suspicions of the nature of this were confirmed on reaching it, by the first blocks of stone which I picked up proving to be an augite porphyry of unmistakeably volcanic origin. A steep road leads up this cliff, the greater portion of which consists of sand, with a cap of volcanic rock, which has evidently preserved the soft underlying beds from the denudation which has reduced the level of the country around.

After ascending the scarp, a walk of about two miles brought me to the town of Puppá, from which the mountain derives its name.

\* Endothá is at least 1000 feet above Pagán. At the former place my aneroid at noon marked 28.3 inches, the thermometer being 83°.

It is close to the foot of the volcano, and is said to have been a place of importance in the days when Pagán was the capital of Burma, but it is now only a small village of about forty houses, built in the usual Burmese fashion. I am inclined to doubt its ever having been a place of large size, for I saw no remains of pagodas around, and such usually abound in Burma in the neighbourhood of all towns that have once been wealthy.

The climate here is evidently very much altered; the neighbourhood of the mountain and the increased elevation rendering it much moister than below. The temperature at sun-rise, on the three mornings I was at Puppá, viz., 28th, 29th and 30th October was  $73^{\circ}$ ,  $74^{\circ}$  and  $76^{\circ}$ . At Pagán on two mornings, October 26th and November 1st, it was  $80^{\circ}$ . The change from the barren sand of the Pagán country to the rich soil produced by the decomposition of the volcanic rocks, causes perhaps an even greater alteration in the vegetation than would result from the increased moisture. Rice grows around the town, and fruit trees of many kinds replace the tamarinds which alone seem to flourish around the villages of the sandy country. The elevation by aneroid is about 1,600 feet above Pagán, or 1,900 above the sea.\* Water is obtained from a fine spring, which, besides supplying the inhabitants, irrigates several paddy-fields. Indian corn is also largely grown, and in one house I saw it stored in the same peculiar manner as is practised in Sikkim and Nepal, viz.: hung around the top of a post. It is generally, however, strung upon a beam.

October 28th, I started early for the peak. The path led for two or three miles through jungle, the trees being large at first, and

\* At Pagán, October 26th, 1861.

Aneroid at 6.30 A. M. 29.665, thermometer  $80^{\circ}$ .

October 31st, ditto at 12 noon, 29.505, ditto  $84^{\circ}$ .

November 1st, ditto at 6 A. M. 29.515, ditto  $80^{\circ}$ .

At Puppá,

October 27th, ditto at 6 P. M. 27.905, ditto  $86^{\circ}$ .

28th, ditto at 6 A. M. 27.905, ditto  $74^{\circ}$ .

29th, ditto at 6 A. M. 27.72, ditto  $73^{\circ}$ .

30th, ditto at 6 A. M. 27.74, ditto  $76^{\circ}$ .

Very little reliance can be placed upon any of the altitudes mentioned except as approximations. Those of the mountain are much above the level at which an aneroid, the only instrument I possessed for measuring the height, is trustworthy; and my only means of comparison is the mean of the Calcutta observations. Still I have no doubt that those mentioned above are approximations, and as such better than mere guesses. The higher ones are probably in excess, and I suspect the peak is not really more than 4,700 or 4,800 feet in height at the outside.



diminishing in size above. The dampness of the climate was shewn by the presence of several ferns: I counted nine species in the lower part of the hill alone.\* About 2000 feet above the town, the path emerged from the jungle upon the grass slopes of the crater. Just beneath this, the trees evidently shewed the effect of elevation, they were thin, with but few straggling branches, and covered with ferns, mosses and lichens. So far the ascent was easy, except that the jungle had, in places, somewhat overgrown the path, but there was a sharp climb to the peak, which is on the South side of the mountain. From this point the view is very fine, extending from the Arakan Yoma mountains, which are seen stretching for at least 100 miles, on the West, to a range of hills, apparently of nearly equal extent, on the East. These, I was told, are called Llein-dha and Theyin-dzu mountains, and are near the town of Penthelé. They could scarcely have been less than eighty miles distant. The whole of the country to the East, so far as its features could be made out, appeared to resemble that through which I had passed on my way from Pagán. All must lie at a considerable elevation, and may be, on that account, moister and less barren than in the neighbourhood of the Irawaddi. All the small ranges of hills seen to the West resembled the Taywandoun, but to the East and South, hills were rather more numerous and irregular in form. One low range of somewhat indefinite shape and direction stretches away for some distance towards the S. E. from the base of Puppá, and I was led to speculate upon the possibility of its having been a lava stream, but, from the description given to me by my guides of the rocks composing it, I am doubtful if such is the case. The sandy beds of streams are seen stretching away for miles, one winding away for an enormous distance to the South is said to be the large stream which flows into the river a few miles above Yénánkhyoung.

The mountain itself is a very fine extinct volcano, the highest peak being approximately 5000 feet above the sea.† A strong wind was blowing, and the thermometer at midday stood at 79°, indeed it was so cool that, while I was waiting for a few clouds, which were

\* I only know of five or six species which grow near Thayet Mio and above they are I suspect almost unknown until the Shan hills are reached.

† On the highest peak 28th Oct., aneroid at 11 A. M. 24.75, thermometer 79° Ditto ditto at 3 P. M. 24.62, ditto 79°.

South peak ditto at 10 A. M. 25.05, ditto 76°.

passing rapidly over the highest peak, to clear off, I preferred sitting in the sun, and out of the wind, which came roaring up from the great central hollow. The crater is about a mile across, and the sides stretch down in black precipices to a depth of probably not less than 2000 feet. I regretted much that I could not devote a day to the examination of the interior of the crater. Dense jungle filled the bottom, and trees grew upon the sides wherever there was a hold for their roots. On the North side or a little East of North, the side of the crater has been broken down, so that no lake exists within. The South side, opposite to the gap, is far higher than to the East or West, and the two highest peaks, one about 300 feet above the other, are about half a mile apart, and owe their prominence to being composed of dykes of a very granular and ill crystallized rock, which has resisted the wearing effects of decomposition and rain better than the softer beds of volcanic ash which form the cone, and the bedding of which is beautifully seen inside the crater. Their slope is about  $35^{\circ}$  to  $40^{\circ}$  in most parts. The whole upper portion of the volcano is formed of these ash beds, the lava flows having apparently been lateral.

I regret much that my ignorance of botanical science prevents me from giving any detailed account of the vegetation of this peak. There appeared to be a peculiar mixture of tropical and temperate forms, and the latter must be interesting from the complete isolation of the hill. The common brakes, *Pteris aquilina*, is abundant, together with two other ferns\* of more tropical appearance. A large thistle with formidable spines is common, and the only plant which has any claims to be considered a tree is, strangely enough, the wild date palm.† A few straggling trees inside the crater were dwarfed and covered with lichens and mosses.

\* One is I think *Nothochlæna argentea*.

† I have heard that the same is the case on the Western Gháts of India.

The complete change in the vegetation below 4000 feet upon a hill in Burma is very curious, when it is remembered that no such alteration takes place upon Parasnath (4500 feet high) in Bengal, a mountain which may fairly be compared, as being very nearly as high as Puppá, and equally isolated. The lower level to which temperate plants descend East of the Bay of Bengal has been attributed to the greater moisture of the climate, but, in upper Burma, the rain fall must be far less than in Bengal, and little if at all heavier than in the plains of the Carnatic. It is scarcely possible that more rain falls on Puppá, separated from the sea by the high range of the Arakan Yoma, than on Parasnath, with no such barrier to intercept the moisture.



I turned up several three toed quails in the grass, but saw scarcely any other birds. The only large animal common on the hill is said to be the goat antelope, hemorhedus, which I had not the good fortune to see, although I came upon fresh tracks. They are said to keep mostly in the jungle, only occasionally venturing out upon the grass slopes to feed. The same animal is common on the Shan hills, East of Ava. The tigers said to abound upon Puppá are, I imagine, of nearly as dubious authenticity as the Náts and Bilús which also have the credit of taking up their residence there.

I found very few land shells, the only species which were abundant were an *Alycæus* and a *Diplommatina*, both undescribed species. Somewhat to my surprise also I found *Helix Huttoni*, Pfr., a shell which occurs upon the Himalayas from Landour to Sikkim, and which I have also met with on the Nilgiris of Southern India. It was not very common. A smaller helix completed the list. Not many species, however, could be expected from an isolated peak. Near the base I found *Cyclophorus fulguratus* which I had not met with further North and one or two other species.

29<sup>th</sup>.—I passed the day in a partial examination of the rocks at the foot of Puppá, in the hopes of ascertaining the geological age of the volcanic outburst. I went first to the very singular hill of Toung-galá, which lies W. by S. of the principal peak and is almost detached from the terrace before mentioned. It is a mass of very beautiful augite porphyry (somewhat trachytic in its composition,) and is evidently a comparatively isolated outburst, sandstones occurring between it and the large hill. It has, possibly, formed the nucleus of a lateral outburst of lava, but, if so, subsequent denuda-

What rule governs the limit of grass on Indian mountains?

On the moist Sikkim Himalayas it is not found below 12,000 feet at least, on the drier eastern portion of that range it is, I believe, considerably lower. On the eastern side of the Nilgiris, it is about 6000 feet. On the Kolamullies near Trichinopolye (as I have been informed by Mr. Foote) grass occurs at about 5000. On Shwe oo toung, North of Ava, in a much damper climate than Pá-gán, only the topmost peak as seen from Malé appears to be covered with grass. This mountain is certainly I think higher than Puppá, and Dr. Oldham estimated it at 6000 feet. So far we might suppose, that the drier the climate the lower the level of the grass slopes. But on the other hand, the level is much lower on the wet western side of the Nilgiris than on their drier eastern watershed, and on the wettest of all the Indian hills, viz., the Khasi range, it is said to be as low as 4000 feet. On the mountains west of Moullmain it is between 7000 and 8000 feet according to Major Tickell. The rocks on Puppá are peculiar, but nearly all the other mountains mentioned consist of gneiss.

tion has removed all traces of the vent and left a solid projecting mass, with a shelving top. It is precipitous on every side, and all my endeavours to climb it were useless, for although, in one place, I reached within about 100 feet of the top, I could not get higher without a ladder. The Burmese said that formerly it could be scaled, but some rocks had since fallen down, and now they could only get up by means of bamboos. As I had so little time, I would not waste it by waiting to make a ladder, but went on to examine the beds forming the scarp already referred to as surrounding the mountain. The results, which I only made out clearly on the following morning on my way down from the mountain, when returning to Pagán, were the following.

The great terrace consists of sands and sandy clays generally horizontal, but occasionally disturbed, probably by dykes, which abound in the neighbourhood of Toung-galá and in some other places. On the top is a cap, varying in thickness, of ash beds and lava flows. This cap is beautifully seen on some small outliers detached from the terrace and called Toung-thong-loon (the three hills) which lie about three miles west of the village of Puppá, and consist of sand with a covering thirty or forty feet thick of volcanic ashes, upon which rests lava of about the same thickness. All of these lavas are of the same character as the rock of Toung-galá, but less distinctly crystallized.\* From opposite the most southerly of the Toung-thong-loon, a valley excavated by a stream, the head-waters of which supply the village of Puppá with water, extends for some distance into the hill, and its precipitous sides, where not concealed by tatees, shew the fine section given beneath. The thickness assigned to each bed is only approximate, as the sides of the valley were, in most places, too nearly vertical to be accessible.

1. Lava of variable thickness capping the whole.

2. Soft sands and sandy clays, yellow and greenish

with black specks; micaceous, about .....

80 feet.

\* I am not quite certain whether the mineral I have called augite may not be hornblende. A few detached crystals which I found among the ash beds near the top of the mountain had the crystalline form of the latter mineral. The mass of the lava is grey and somewhat resembles phonolite, but is beautifully marked by the black augite (or hornblende) crystals. It would be a beautiful stone for ornamental purposes.



3. White sandy bed abounding in fragments of pumice to which its colour is due. Wanting on the South side of the valley ; on the North about, ..... 15 feet.
4. Volcanic ash containing quartz pebbles, thicker on the South side of the valley than on the North, ..... 5 to 15 „
5. Ferruginous gravel and sandy clay, containing quartz pebbles of small size, and numerous concretions of peroxide of iron, the iron ore of the country. Variable in thickness, ..... 1 to 4 „
6. Coarse sand mostly yellowish with white specks.

It contains pebbles in places.

Upwards of 100 seen.

It is evident that the ash bed, No. 4, is of the same general age as the sands above and below, and that it was deposited in water is clear from its containing quartz pebbles. There can, therefore, be no doubt that it records an eruption of the mountain, perhaps with an east wind blowing, at the time when the lake or estuary, which then surrounded Puppá, was being gradually filled up by sandy deposits. There can be also little question as to the identity of the beds of the above section with the sands and conglomerates containing fossil wood and mammalian bones at Yénánkhyoung, Pagán, &c. Fragments of fossil wood evidently derived from these deposits are found about Puppá, and to complete the evidence, I found a piece, not rolled as such blocks are in the more recent gravels, in situ in the ash bed itself.

The period during which Puppá was in action was therefore, in parts at least, not later than that of the deposition of beds containing remains of *Elephas*, *Mastodon*, *Rhinoceros*, *Hippopotamus*, and *Ruminants*. The geological age of these beds has, with some doubt, been considered to be Miocene, but from their general fauna, and especially from the abundance of bones of *Bos* and *Cervus*, a more recent date may, I think, with at least equal probability, be assigned to them. There can be no question but that the fires of Puppá have long been extinct ; its thick coating of jungle and grass, and the existence upon it of species of plants and animals, which, for want of a suitable habitat, cannot exist in any neighbouring locality, and the evidence of the effects of subaërial denudation on its surface,

render it certain that it must long have been in a condition for vegetation to flourish upon it, but it is scarcely possible, even in the dry climate of upper Burma, that a volcano of Miocene age should have retained its form so perfectly. It is more probably Pliocene. Its bulk is not great, and, from the absence of other vents in the neighbourhood, so far as is known, it is scarcely probable, that its volcanic activity can have extended over a lengthened geological period. I could not learn that there was the slightest tradition among the people as to its ever having been in action within the memory of man, a circumstance, on the grounds mentioned, extremely improbable. The occurrence, on the summit, of the common brakes, and doubtless of other plants of temperate regions, renders it probable that the close of the glacial period found its surface in a fit state to support vegetation.

The discovery of a volcano of comparatively recent geological date in Burma is the more interesting from the circumstance that the long line of volcanoes which has been traced throughout the Eastern archipelago has hitherto appeared to end abruptly at Kyouk Phyú on the Arakan coast. The so-called mud volcanoes of Memboo have no connexion with true volcanic action, but igneous eruptions have been recorded at Kyouk Phyú and Chedúba.\* Puppá is very little removed from the continuation of a line passing through Barren island and Ramri, and there is thus a possibility of the extension of the great eastern line of volcanic outbursts into the countries of Western China; probably, as at Puppá, in the form of extinct cones.

I left Puppá on the 30th October, and reached Pagán the next day about mid-day, the road by which I returned being somewhat shorter than that by which I went to the mountain.

\* There is a great peak standing out prominently from the west or Arakan side of the Yoma, a little north of west from Ramri. I have no idea of what its geological formation is, but it does not look like a volcano. Still it may have been one.

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*An account of Upper and Lower Suwát, and the Kohistán, to the source of the Suwát River; with an account of the tribes inhabiting those valleys.—By Captain H. G. RAVERTY, 3rd Regiment, Bombay N. I.*

In August, 1858, I sent an intelligent man, a native of Kandahár, who had been for many years in my service, and who spoke and understood the Pushto language well, for the purpose of obtaining a scarce work in the Pushto language “the history of the Yúsufzí tribe, and their conquests in Suwát and other districts near Pesháwar, by Shaykh malí, Yúsufzí,” a copy of which, I was informed, was in the possession of the chiefs of Tárrnah, one of the divisions of Suwát. That valley, although so close to Pesháwar, is almost a *terra incognita* to us; and various incredible reports have been circulated about the fanaticism of its people and their Akhúnd,\* who is made out to be employed, the whole of his time, in plotting against the English; and has had the credit of every disturbance that has taken place on the frontier since the annexation of the Panjáb. Such is his power, so they would make out, that armies of Gházís arise at his bidding, and that he makes and unmakes kings at his will. On this account, now that an opportunity offered, I was anxious to gain as much information as possible on this subject. The person I sent had on previous occasions collected information for me, on such matters, and was acquainted with the chief points on which inquiry should be made; but I also furnished him with a number of questions, the replies to which have been embodied in the following pages, and will account for the rambling style in which, I fear, it has been written. At the end will be found a description of Suwát, taken from a poem in the Pushto language, written about two hundred years since, by the renowned warrior and poet, Khushhál Khán, chief of the Khattak tribe of Afgháns.

“On the 14th August of the year 1858, agreeably to your orders, I set out from Pesháwar, in company with the KHÁN SÁHIB,† towards Suwát. Our first journey was to Hashtnagar; and in the

\* A Persian word signifying, a tutor, a preceptor.

† The name of this chief I have not given, as he would not like it to be known, lest it might create heart-burning against him.

village of Prráng I purchased three quires of English paper, as requested by him, which I made over to Sháhbáz Khán to have the *manuscripts* of the poem of Khusrau and Shírín copied thereon by the time I returned. The next stage brought us to Jamál Garraey, the residence of Muhammad Afzal Khán, Khattak. On the 17th August, we proceeded by way of the mountain of Chíchárr, and the village of Káttlang, which I visited with you when the 3rd Bombay N. I. was here with Colonel Bradshaw's force, in December, 1849. We halted at the village of Kúhai, a short distance in advance, for the night; and the KHÁN SÁHIB sent for the Malik, or head man of the village, to ask his advice as to our entering Suwát, which, as you are well aware, is difficult at all times, but more particularly so for one, like myself, who am a Mughal, not an Afghán. Malik Muhammad Æalí said, that the matter would not be a very difficult one, if Amír-ullah Khán, chief of Pala'í, should consent to allow us to proceed by that route, otherwise it would be difficult indeed. At length it was determined, that in the first place, Muhammad Æalí should go to Amír-ullah Khán, and speak to him on the subject; and in case he should agree to receive us, to bring us his reply accordingly. He set out; and in due course brought us a reply from the chief of Pala'í to the effect, that at the present time, there was continual skirmishing going on between himself and Khurásan Khán of Shír-khána'í and Zor-mandda'í, two villages higher up the valley. You will doubtless recollect also, that these were the self-same villages which were burnt by the force under Colonel Bradshaw before referred to; and it was on the hills, to the north of these villages, that the large force of Afgháns were assembled on that memorable night when you commanded the outlying Picket of the 3rd Regiment, when you heard the Afgháns in front—to get a sight of whom you had gone in advance of your centries, with a simple sepoy—exclaiming in Pushto, that “all the Farangí dogs were asleep,” and that it was a favorable time to come on, not knowing that a hot reception was awaiting them. To return, however, to the message from the Pala'í chief, he said, that in consequence of the disagreement between himself and Khurásan Khán, there were also disturbances at Tármah, the chief town of this part of Suwát, to the Kháns, or chiefs of which they were both related, and who were, themselves, at enmity with each other; and on this account



he considered our going into Suwát, at present, a very difficult matter. This message, however, did not satisfy the KHÁN SÁHIB; and Muhammad Æalí was again sent to the Pala'í chief, Amír-ullah Khán, with another message, to the effect, that "This feud between yourselves will take a long time to settle amicably; and as you are all of one family, if you do not hinder my going, the other party will throw no obstacle in my way." Amír-ullah replied, that he would conduct us, and be answerable for our safety within his own boundary; but he would not be responsible for any injury we might sustain at the hands of Khurásan Khán, the Shír-khána'í chief. The KHÁN SÁHIB accepted these terms; and, next morning, we set out by way of the village of Ghází Bába; and in the evening, before dark, reached Pala'í in safety. We found the Pala'í people, with their loins girded, sitting in their *sangars* or breast works, and occupying the roads and paths by which the enemy from Shír-khána'í and Zor-mandda'í might come upon them. Some of the men too had advanced a short distance from the village, and had placed themselves in ambush amongst the fields, in order to fall upon any of the Zor-mandda'í people who might venture out of their stronghold.

That night we remained at Pala'í as guests of the chief, Amír-ullah, who did all he could to persuade the KHÁN SÁHIB to give up his journey; but he would neither listen to any excuses, nor admit of any obstacles. At length it was agreed on by Amir-ullah, that he should send one of his most trusty followers to his brother, Mír Æealam Khán, one of the Tárrnah chiefs, to let him know, that the KHÁN SÁHIB, (mentioning his name) was on his way to Suwát for the purpose of paying his respects to the Akhúnd Sáhib; and that it was necessary he should treat him with all honour, and perform towards him the rights of service and hospitality, and not allow him to sustain any injury on account of the feud between themselves. The indefatigable Muhammad Æalí, who had also come with us to Pala'í, now went with a message to Khurásan Khán, chief of Shír-khána'í and Zor-mandda'í, to let him know that the KHÁN SÁHIB was coming to his village as a guest, and that he should not be treated as the guest of the preceding day, who had been accidentally killed. This person was a traveller who had been entertained at Pala'í the previous night. In the morning, about dawn,

he wished the gate open that he might resume his journey. The party there advised him to wait until it got a little lighter, but he would not consent; so they opened it for him. He had scarcely advanced a score of yards when he came upon a party of the enemy from Zor-mandda'í, who were lying in ambush for the Pala'í-wáls. One of them, not knowing who it was, fired his matchlock at him, but missed. The guest began to call out, "Do not fire! do not kill me! I am a guest!" The words had scarcely time to pass his mouth and had not, probably, been heard by the enemy, when five or six matchlocks were discharged at him, two balls from which hit him, and he fell dead on the spot. On making inquiry, the unfortunate man proved to be of the Utman-khel. The messenger also added on his own part, that knowing who the KHÁN SÁHIB was, if he should receive any injury from the hands of himself (Khurásan Khán), or his followers, the powerful tribe to which he belonged would burn his villages about his head, and root out all his people. Muhammad Æalí returned with a favorable reply; and on the morning of the 18th August, we proceeded towards Zor-mandda'í, which is only about the distance of a cannon shot from Pala'í; but we were greatly afraid lest the stupidity of the Zor-mandda'í people might lead them to try the range of their matchlocks upon us, who would be in danger of our lives, whilst affording amusement to them; as they relate of the Khaibarís, who, having seized a very stout traveller, thought it an admirable opportunity to try their knives upon him, and did so too; and, of course, killed the poor man. However, we passed Zor-mandda'í in safety, and reached Shír-khána'í, where the KHÁN SÁHIB obtained an interview with Khurásan Khán, the chief, who also strongly advised us not to proceed, as we could not have chosen a worse time for our visit to Suwát; but as before, the KHÁN SÁHIB, with true Afghán obstinacy, would not listen to any advice or arguments tending to delay, or put off his journey; so, without staying at Shír-khána'í, we set out for Suwát by the Pass over the Morah mountain, which is hence called the *Morey kolat*.

About a mile or less from the last named village, we beheld to the right, as we proceeded, the road leading to the village of Upper Bári-darah. We passed the road or path leading to the other village of Lower Bári-darah, which was also near; but a spur of the mountains intervening, hid it from our sight. These villages lie in the

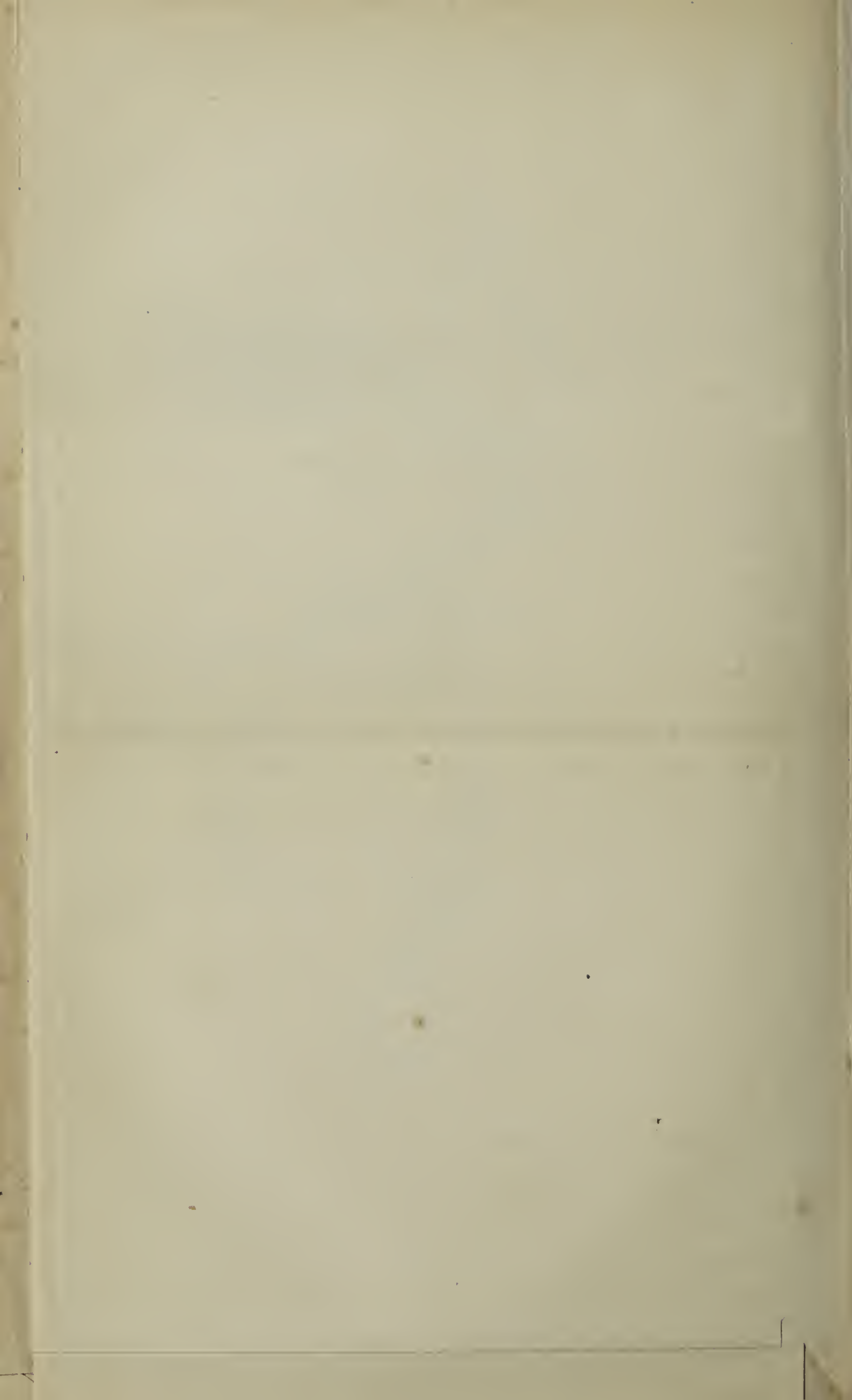


A SKETCH MAP  
OF  
UPPER and LOWER  
SUWÁT  
and the  
KONISTAN  
to the SOURCE of the  
SUWÁT RIVER.

*Note* — The Southern boundary of Suwal is taken from the Map by Lieut JT Walker Bombay Engineers

III<sup>d</sup>. *Regiment - 4<sup>e</sup>. Vol*







valley of Báz-darah, which is so called on account of the number of falcons taken there, for which it is celebrated ; and it is also famous as having been the residence of Durkhána'í the Peerless, whose love and misfortunes, and that of her lover, Adam Khán, have been celebrated, in prose and verse, and is sung or repeated throughout all Afghánistán. We had now to dismount and ascend the pass on foot, as it is full two miles in ascent ; and no loaded camel could possibly get up it, unless, indeed, it were one of the Bákhtrían breed ; but then at considerable risk, even if without a load. The Pass is, however, practicable for ponies, horses, mules, and bullocks. We observed immense quantities of the grass called *sábah*, with small leaves, and growing very long ; and also that description called *sar-garrí* in Pushto, which is the same as that given, dried, in bundles to horses in the Bombay Presidency. The *sábah* I never saw before. The ground is a steep ascent ; and like most paths of the kind, in this part of the world, it is full of boulders, in all directions. The path does not lead along between two cliffs, as it were ; but is trench-like, and as if deepened by heavy floods. It is very winding ; and appeared to consist of a soft description of stone, like sandstone. As we went along, the KHÁN SÁHIB remarked, that if any one wanted to make a good road into Suwát, this was the best for the purpose on account of the softness of the stone, whilst in the other *kotals*, or Passes into the valley, there was only hard rock. This I found quite correct when I returned by the Malakand Pass. The breadth, as we ascended, was in some places so broad as to allow of the KHÁN SÁHIB and myself walking abreast ; but, generally, it was so narrow that we had to proceed in single file. There are no pine trees in the path itself ; but the sides of the mountains, to the very summits, were clothed with patches of them. It is from the cones of this description of pine that the nut-like kernel, similar to the pistachio, is produced ; but they were not, then, sufficiently ripe. This Pass also contains, and in fact all these mountains contain, immense quantities of a sort of gravel, both coarse and fine, which is like small shot, and very heavy. It is called *charata'í* by the Afgháns, who use it to shoot partridges, pigeons, quail, and the like. I saw it, generally, in all the different Passes ; and in Upper Suwát, I also saw it on the roads and paths, but did not notice any in the ravines or beds of rivers. Its colour is that of earth, turbid, or nearly black, and very

heavy, not smooth like the gravel of the sea-shore or beds of rivers, but rough and many-sided, like as if stone had been broken into particles and then become somewhat rounded from having been rubbed together.\* This gravel has no doubt given the name to another Pass, a little to the west of that of Morah which we were ascending, known as the Charat Pass. I noticed the path leading into that Pass; and have been told that it is very steep and difficult, and only practicable for parties on foot, and animals without loads. The direction we proceeded in from Sherkhána'í first branched off a little to the right; and the path to the Charat Pass lay to our left, in a direction about north-west. I had collected a small quantity of *charata'í* to send to you, but lost it, somehow or other, before I reached Pesháwar. In Upper Suwát they call it *gítta'í*, but this is the Pushto term for gravel in general. I have no doubt but that it is some mineral substance containing iron, and that it has become rounded by the action of water; for, in the winter, the ravines become the beds of torrents.

We saw numbers of partridges of two species, the grey and the black, besides a great many quail.

By degrees we had now reached the crest of the Pass; and on descending a short distance on the other side, we came to a plane tree, beneath which there is a spring of the most cool, pure, and sweet water; and round about it numerous spikenards were growing. In short, it was a very delightful spot; and we sat down and rested for some time, and refreshed ourselves with draughts of the crystal element. This is the only spot in the Pass where water is procurable. When standing on the crest of the mountain, at the summit of the Pass, I could see the Suwát valley to the north, but could not perceive Tárrnah, for it was screened, or hidden, by the mountains. I could, however, see the village of Nal-bánddah; and by going a little on one side, in an easterly direction, I could discern Shírkhána'í to the south.

We now commenced to descend into the Suwát valley. The southern side of the mountain which we had just ascended, was extremely steep; but we did not find it anything near so much so descending on the northern side, the Suwát valley being much more elevated than that of Báz-darah and Pala'í which we had recently

\* Emery?



passed. At the foot of the Pass, and directly under the mountains, we came to the village of Nal-bánddah, the first we reached in Suwát. It is said, that a husbandman of this place once found a number of gold coins in a well close by; but the other villagers, hearing of it, took the treasure from him, and shared it amongst themselves, after which they filled up the well, that no one should get any thing out of it in future. We asked two or three parties on what side of the village the well was situated, but they would not point it out, and said to us: "So you are come here to discover treasure, are you! be under no concern; for your wishes will not be fulfilled."

After proceeding two coss or three miles further on, we reached the town of Tárrnah, to the west of which there is a small stream; and on the banks of it, there is a fine grove of *chinár* or plane trees, about a hundred in number, all very ancient, very large, and very lofty; and here we came to a halt.

Mír Æalam Khán, the chief of Tárrnah, came to pay his respects to the KHÁN SÁHIB; and after some conversation, the chief, who had been eyeing me for some time, inquired who I was. The KHÁN SÁHIB replied, "He is a Mullá, and is going on a pilgrimage to the Akhúnd Sáhib." He replied, "He is no more a Mullá than I am; but you have made him one for the nonce." On this the KHÁN SÁHIB observed, "Probably Amír Ullah Khán of Pala'í may have advised you of my being on my way into Suwát." He laughed, and replied: "The day you left Jamál Garraí I heard of your coming to pay your respects to the Akhúnd Sáhib. It is all well: allow no matter of concern whatever to enter your mind; but the people of Suwát are so celebrated for their stupidity and thick-headedness, that it is necessary you should be prudent and circumspect in every thing." The Kháns or Chiefs of Tárrnah are descendants of Hamzah Khán,\* the founder of the village of that name in the Yúsufzí district south of Suwát, and about eight miles north of Hotí Mardán. He lived in the time of Khushhál Khán, Khattak; for it was his daughter that Khushhál mentions in his poem on Suwát, as having married when there, or whom he was about to marry; and she was mother of his son, Sadi Khán. Hamzah Khán was the then ruler of Suwát, and held sway over the *Samah* also. It was he also fixed

\* See the extract from the poem at the end of this paper.

upon Tárrnah as the permanent residence of the Chiefs; as it was centrally situated, amongst his own clan, the Solízís of the Bá'í-zí division, by which name the people of Tárrnah are still called; but they are, sometimes, also styled the Khán-khel, or Chieftain's clan. The Khán-khel too may be subdivided, according to what the KHÁN SÁHIB said. The one being the family to which the Chief *de facto* belongs, the whole of the males of which are called Kháns; and the other, the family to which the Chieftainship rightfully belongs, or the Chief *de jure*, but whose family may have been set aside, or passed over, which is merely the Khán-khel. For instance: if a Suwátí be asked to what clan a certain person belongs, he will say the Khán-khel; but it must be then asked whether the person is a Khán or only one of the Khán-khel. If he be a member of the family of the Chief *de facto*, he will reply he is a Khán; but if of the family who may be the rightful claimants to the Chieftainship, but passed over, or set aside, he will say he is of the Khán-khel. The Tárrnah Chiefs *de facto*, who are the heads of the Bá'í-zí division, are of two families, the *bar-kor*, or upper family or house, and the *kúz-kor*, or lower family or house, in reference to Tárrnah and its dependencies above the Morey Pass, and Pala'í, and its dependencies below. These two families are descended from Jalál Khán, son of Hamzah Khán, above referred to, and are always at feud. Mír Æalam Khán Chief of Tárrnah, Amír Ullah Khán ruler of Pala'í, and Maesúm Khán, their brother, who dwells at Tárrnah, are of the *bar-kor*; and Khurásan Khán, ruler of Zor-manddaí, Sher-khána'í, and the two Báz-darah villages, and Bábu Khán, who resides also at Tárrnah, belong to the *kúz-kor*. Mír Æalam Khán, who is considered the greatest of the Tárrnah Chiefs, is about fifty years of age. The next in rank and consideration is Maesúm Khán, his brother, who is about thirty years old; then comes Amír Ullah of Pala'í, aged forty, and Khurásan Khán of Zor-mandda'í who is about fifty years of age; and Bábu Khán of Tárrnah aged fifty, besides numerous children.

The day passed away pleasantly enough under the shade of these beautiful trees; and in the evening we went to the residence of the chief; and in his guest chamber we remained the night.

Tárrnah, which is the most considerable town in Suwát, contains somewhat more than 1,000 houses, which, at the usual computation,



gives about 5,000 inhabitants. The people are Afgháns of the Bá-í-zí branch of the powerful and numerous tribe of the Yúsufzís. About a hundred houses are inhabited by Hindús, Paránchahs, and other traders, who also follow such occupations as that of shoemakers, smiths, barbers, &c.

The town of Tárrnah lies a short distance from the skirt of the mountains bounding Suwát to the south, and on the eastern bank of the river of the same name, the Suastus of the Greeks, from which it is distant about half a mile.

The village of Nal-Bánddah, which was previously referred to, lies at the very skirt of the Morah mountains, on a spur which has become separated from the higher range and runs about three, or three and half miles a little to the mouth of Tárrnah.

After passing Nal-Bánddah, the land slopes down to the river, but not in such a manner that anything set a-going will, of itself, ride down to the river. The land of the whole of Suwát, in fact, is like a boat, the sides of the boat are the mountains, and the bottom part the land, as different materially from the mountains. The lowest land in the valley is that portion through which the river flows; and it gradually rises until close up to the mountains. It may also be compared to the two hands placed together like as when one wishes to drink out of them; but only just sufficiently raised so as to prevent the water from running out.

I found, from what I heard of the most respectable inhabitants of Tárrnah, that Shaykh Malí was a Yúsufzí Afghán, and that his descendants still dwell in Suwát; but they could not give me full particulars as to what village they might be found in; neither could they inform me regarding the place where the Shaykh was buried. Khán Kajú, or Kachú belonged to the Rárrnízí branch of the Yúsufzí tribe; and his descendants also dwell in the valley, at the village of Allah Ddaud, and will be mentioned in the notice of that place, further on.

The historical work written by Shaykh Malí is not in the possession of the Tárrnah chiefs; and they, moreover, informed us, that the work would not be found in the whole country, save in the possession of Khán Kajú's family.

We now prepared to start from Tárrnah towards Upper Suwát. On the morning of the 22nd August, we left Tárrnah, bending our

steps towards the north, but inclining to the east, which might be termed N. N. E. We passed the villages of Jalálá, Haibat Grám,\* and Ddandakaey, and reached the mountain of Landdakaey, close at the foot of which the Suwát river runs. On this account, in the summer months, when the river is swollen from the melting of the snows towards its source, in the direction of Gilgit, the pathway, lying along the banks, at the foot of the mountain, is impracticable from the force of the stream, which foams and boils along with great violence. A road, has, consequently, been made over the crest of Landdakaey itself; but it is extremely narrow, and so frightfully steep, that one of our own party, an Afghán, and accustomed to the mountains from his childhood, passed with the greatest difficulty; for when he ventured to look down he became quite giddy. In the cold season, when the volume of water decreases, the path at the foot of Landdakaey is used. This last named mountain has no connection with that of Morah; but it is a spur of the range, of which Morah is a part, that has come down close upon the river, or rather the river washes its base, as appears from the map, which you sent with me to be filled up. In this part of the river, there are two branches, one much more considerable than the other. The lesser one becomes quite dry in the cold season, and in the hot season has about three feet depth of water. This is very narrow, with steep banks and rugged bed, along which the water rushes impetuously. The other branch contains a much greater volume, and lies furthest from the Landdakaey mountain. On ascending the mountain, up to the end or extremity of the spur, where, in the map, I have brought the mountain and river together, the road leading along the side of the precipice is very difficult, being naturally scarped, like a wall, for about fifty paces; and the road, if it can be so called, is built up into rough steps with slabs of stone, so very smooth, that a person is liable to slip. After this dangerous path has been passed over, you have to ascend about fifteen paces, then some twenty more in a horizontal direction; and, finally, fifteen paces, or thereabout, down again. I mentioned before, that one of our party had great difficulty in getting along: this was no other than the KHÁN SÁHIB himself. When we came to this dangerous passage, he stopped and waxed pale; and turning towards me said: "I die for you." I was

\* Grám in Sanskrit signifies a village.



astonished, and asked, "Why?" He replied: "My eyes turn díim, dim." I comforted him as well as I could, and took off my shoes; and with my face to the river and back to the mountain, I crawled along, and he followed after me; and so afraid was he, that he looked at the river every moment, although I forbade him; but he was so overcome with horrid fancies, that he had not the power to restrain his eyes. This difficult path is not quite a yard broad, and is, at least, two hundred yards above the river, which foams beneath. After we had escaped from this place in safety, the KHÁN SÁHIB came to himself again, in some measure; for he put on his shoes, and began to walk upright. I could not discover who had made this road, although I afterwards made inquiry. There is another road to the east of the one we had passed, which leads over the crest of Landdakaey itself, and by it animals are brought, when the water is at its height, but I did not examine it. We noticed that on the opposite side of the river, the mountains forming the north-western boundary of the Suwát valley approach within about three miles of this point. The river is said now to have entered that part of Suwát termed *wuchah* or the dry, which will be referred to in its proper place. Landdakaey is about three miles distant from Tárrnah, to the north.

After getting clear of our difficulties, and out of our dangers, we reached the small village of Kottah, to the south of which, on the very summit of the mountains, there are extensive ruins of buildings, so numerous indeed, that I had never seen the like anywhere else. Two of these buildings were large and lofty, something as European barracks appear from a distance. They are still in excellent preservation, and indeed seem quite perfect and entire; so much so, that during very heavy rains, the villagers take shelter in them. The houses of this ruined city are not built near each other as we see in the present day, but are detached similar to the *bungalows* of officers in India. I could not discover any thing in the shape of carvings, or idols any where about. The ruins of these dwellings are square, and are built of hewn blocks of stone; and are very shapely in appearance, but not very lofty, not being more than six, or under four yards in height. The walls were about half a yard in thickness, and in some places less. Each house contained an area of about six yards. The cement used in joining the stones together is of a black

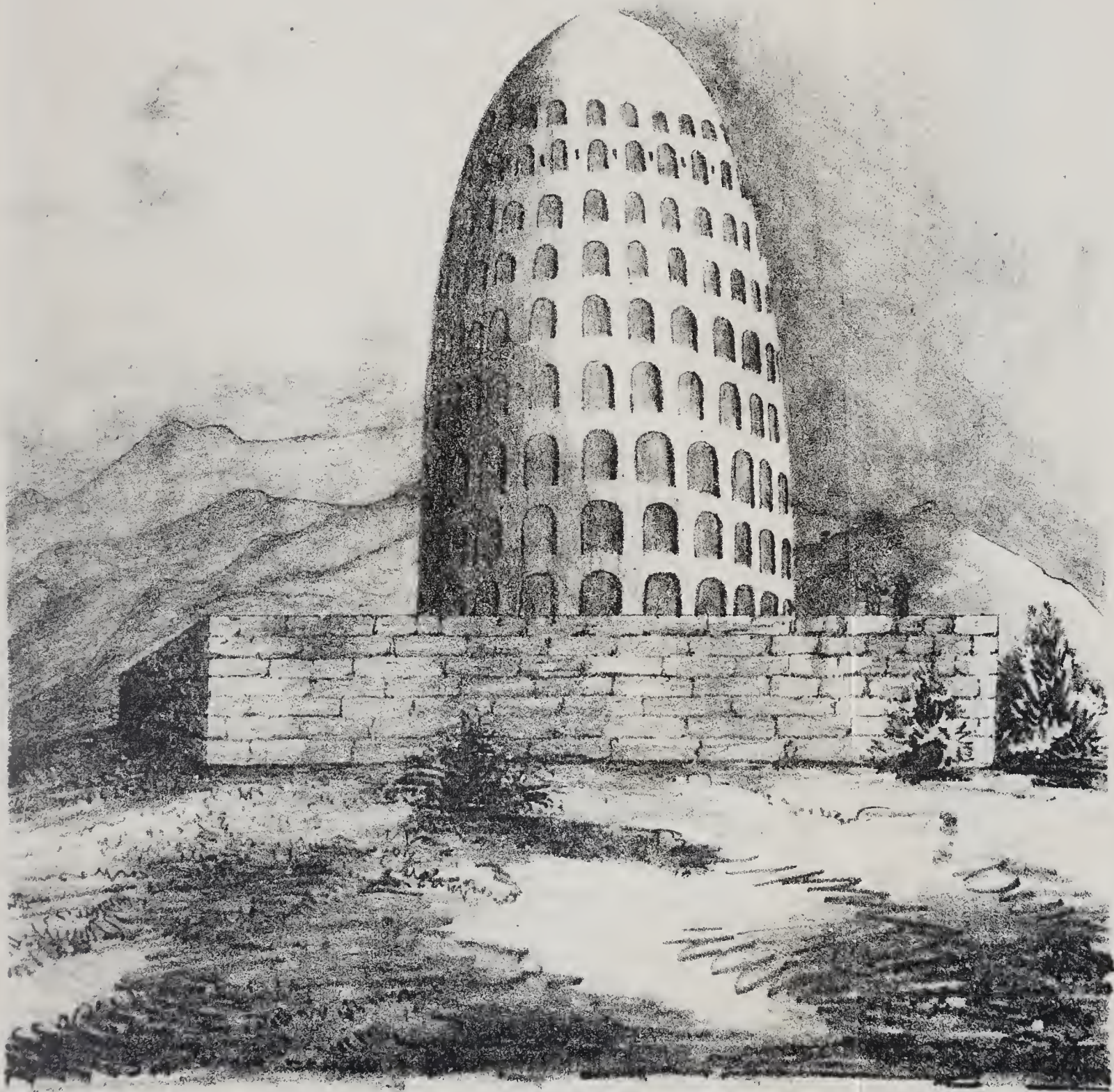
colour,\* but I could not tell whether it was lime, mud, or anything else. Every house has a door, as have the two larger buildings also. These ruins are of Buddhist, not of Grecian architecture; but are like those at Bihí near Pesháwar, which we visited together in December, 1849; and are altogether without verandahs. The large buildings I refer to, as situated on the very brow of the mountains are said to have been built by Suwátís of former times as watch-towers; but in my opinion they are the remains of idol temples, which Hindús often build in such places, as at Purandhar near Poonah in the Dekhan, which I accompanied you to, in 1852. There is no made road leading to these buildings, for they are very near to the open ground of the valley; but, probably, there was once a made road, which has now disappeared. This ruined city is close to the Landdakaey mountain, but the village of Kottah is nearer, and Baríkott is still further off; for this reason I have written “near Kottah instead of Baríkott.” This is, no doubt, the ruined city mentioned by the French Colonel Court† as near the last named place, which is a large place, whilst Kottah is but a small village. The ancient ruins in Suwát are situated in such difficult and out-of-the-way places, that it becomes a matter of astonishment to conceive how the inhabitants of them managed to exist, where they obtained water, what they employed themselves on, and how they managed to go in and out; for several of the houses are situated every here and there, on the very peaks of hills; but Suwát does not contain so many ruined sites as writers would lead us to believe.

Proceeding on our route from Kottah, we saw the villages of Nowaey-Kalaey, Abú-wah, Gurataey, Barí-kott, and Shankar-darah. Close to this latter place, there is a tower called Shankar-dár. Shankar, in the Sanskrit language, is one of the names of Siva. It stands on a square base of stone and earth, seven yards in height, and just forty yards in length and breadth, which I myself measured. On this square platform, the tower, which is of stone, joined by the dark coloured cement I before mentioned, stands. I computed the height, from the base, which I had measured, to be about thirty yards, or ninety feet; and I also measured the base, which was twenty-five yards or seventy-five feet in circumference. It is egg-

\* Probably bitumen.

† Asiatic Journal of Bengal, for 1839, page 307.





H.G. Raverty. 1862.

TOWER OF SHANKAR-DAR, SUWAT.

On stone and Lith: by H. M. Smith, Surveyor General's Office, Calcutta Sept, 1862





shaped, as in the annexed sketch ; and there is no road by which the summit may be gained, nor did it appear to be hollow inside ; but there are small holes just large enough, to all appearance, to admit the hand, every here and there, which seem to have been indented to give light or air. From top to bottom the tower is vaulted like that of the *mihráb* of a mosque, but not so deeply indented or niched that one might place the foot thereon, but about a finger's breadth only ; still the vaulted shape could be distinctly traced to the summit. Each niche or recess is about a yard or more in length and breadth ; and between each of these there is the hole, before mentioned. As the height increases, the *túks* or niches diminish in proportion. The Afgháns of the neighbouring villages have been removing stones for building purposes from the northern side of the tower, and have built several houses therefrom, hence it has sustained considerable injury on that side. The people tell all sorts of tales about the tower ; and all agree that Akhúnd Darwezah, the celebrated saint of the Afgháns, who flourished from the year A. D. 1550 to 1600, gave out, in his lifetime, that this tower contained seven idols, one large, and six smaller ones.

After leaving the village of Shankar-dár we passed Ghálí-gaey, which from some accounts, is said to have been the native village of Durkhána'í, and that her people had taken their flocks to graze in the Báz-darah valley, where Adam Khán met her ; and that Adam Khán himself dwelt at Barí-kott. The clan to which Adam belonged is still to be found in Suwát, but Durkhána'í's cannot be so easily determined ; for on account of the notoriety of her love for Adam, which these stupid people deem a disgrace, no one would acknowledge her as having belonged to his clan, even were such the case. Some say she was of the Khá'íst-khel, others say it was the Khází-khel, and some say she was of the Rárrnízí tribe. However, there is no doubt but that her husband, Piawaey, was of the Khází-khel, and doubtless Durkhána'í was of the same clan also.

We now reached the village of Mányar, where there are two small ancient towers or *topes* facing each other ; and then passed on to Gog-darah, Panjí-grám, and Waddí-grám, which latter place is nine *coss*, or thirteen and half miles from Tárrnah ; and here we halted for the remainder of the day.

To the east of this village, on the central summit of a mountain,

there are a great many ruins, consisting of dwellings, and a very large range of buildings like a fortress, enormously lofty, which can be distinctly seen from a long distance. I did not go myself to examine these ruins, because it would have been necessary to have remained at the village for two or three days for the purpose; and to do so, in a country like Suwát, would have raised suspicion, therefore the KHÁN SÁHIB would not consent. I was told, however, that the children of the village, as mischievous in Suwát as in other countries,\* had left nothing in the shape of carvings or images within it. There is also an immense cave in the side of one of the mountains, which cannot be entered from below; and from above, even by the aid of ropes, it cannot be reached, or at least, those who have attempted it have not succeeded. I was told by some of the Waddí-gram people, that several persons did once set out to make the attempt, and lowered down a rope, so as to reach the mouth of the cave; but it was not long enough, and they returned. No other attempt appears to have been made. The tale goes, that the cave belonged to the Káfirs of old, who had a secret path or entrance; and having deposited treasures within it, concealed the path and shut it up altogether. Whoever finds that path, will get the treasure.

I saw a few ancient copper coins here, but they were not worth purchasing; and moreover, the Suwátís, particularly the Hindús, say that from every copper coin of the ordinary size, two *máshas* of pure gold can be extracted, worth three rupees or six shillings, which was the price they asked for them. Throughout the whole of Suwát, at present, whenever any old coins are discovered, they are immediately sold to the Hindús or Paranehah traders, who transmit them to their agents at Pesháwar; and on this account, old coins are not easily obtainable, unless a person remain some time. The people of the village also told me, that there had been idols found in the neighbourhood; but they had, as a religious duty, broken them to atoms, and not a remnant of them now remains. Between the village of Mán-yár and Waddí-gram, there is a rudely carved idol by the side of the road, cut out of the white stone of the cliff itself, and in the figure of an old man in a sitting posture. Every one that passes by throws a stone at it; so there is an immense heap of them near.

I examined the whole of the Pushto books of the villages between

[\* Cf. *supra*, p. 128. Eds.]



this and Tárrnah, which were chiefly on theology; but at Waddí-gram I found three others—the poem of Yúsuf and Zulíkhá, by Æabd-ul-Kádir Khán; and the poems of Shaháí Dalí, and Adam and Durkhánái, by Sadr Khán, his brother, all of which you have copies of already.

On the 23rd August, we left Waddí-gram for Míngowarah, which having passed together with the villages of Kambar and Kátthí, we turned down the valley of Saiydúgán, which runs in a south-westerly direction, and reached the village of that name, the residence of the Akhúnd of Suwát.

This poor and pious man has been most grossly belied for some years past, by interested parties at Pesháwar, who cram the authorities with lies; and find it easier to lay all disorders which take place on this part of our frontier, at the door of this harmless man, than to the true cause. He has for many years been made out to be the fomentor of all the troubles on the frontier, and to be constantly plotting mischief against us; but those, who have given ear to such falsehoods, have not inquired how much is owing to the grinding tyranny of Hindústání subordinates, and other causes which shall be nameless. I would ask them one question, however,—“How is it that during the year 1849, we had no walls round the cantonment of Pesháwar and no chowkeydárs; yet less robberies and crime occurred than at any time since, except, perhaps, during the mutiny?” If I recollect aright, the assassination of the late Colonel Mackeson was laid at the Akhúnd’s door; but the very appearance of the venerable old man is enough to give the lie to such a statement. He has been said, at Pesháwar, to possess the most despotic power over a most fanatical tribe; and even the old miscreant who lately set himself up at Delhí, had it proclaimed, that the poor old Akhúnd was coming to assist him with from 12,000, to 18,000 Gházís at his back. I need scarcely add, that the whole is a mass of falsehood got up by interested parties. I will now endeavour to give a sketch of the Akhúnd as he appeared to us.

On reaching the village of Saiydúgán we proceeded to pay our respects to him. He is a venerable looking old man, of middle height, with a white beard, and is about sixty years of age; cheerful in disposition, affable to all who approach him, and with a countenance open and serene. He is learned in the whole of the usual sciences studied

by Muhammadans, to the necessary degree that his position in religious matters demands ; and has no concern in, or control, whatsoever, over the government of the valley, which is entirely held by the different petty chieftains. What they state at Pesháwar and in the Panjáb, about his collecting armies, going to war, and inciting the Suwátis and others to create disturbances, and enmity against the English, are the most barefaced untruths, got up, solely, by interested parties at Pesháwar, and other places.

If, by chance, any injured or aggrieved persons come and make complaints to him, that this body or that body has injured them, he expostulates with the party complained against, either by going himself, or sending another to expostulate in his name, according to the rank of such party. If the expostulation takes effect, it is well ; but if not, the Akhúnd can do no more in the matter.

It is the custom of those of our subjects on the frontier, who may have committed themselves in any way with the authorities, to fly to Suwát, and they come to the Akhúnd, at whose place they remain for two or three days ; for it is the most rigidly followed, and most sacredly observed custom amongst all Afghán tribes, which cannot be broken through, to show hospitality to a guest, however unwelcome he may be. But with respect to the Akhúnd's guests of this description, after a few days have passed, he tells them, with all mildness and kindness, that they will not be able to get on in that country ; and advises them to go to Kábul or some such place. In short, he leads them to understand, in the most delicate manner possible, that they had better leave his dwelling, at least.

What has been said with regard to thieves, robbers, and murderers from the British territory fleeing to the Akhúnd, and being entertained by him, is as false as the other matters which have been advanced against him, and which those, who have, probably, cast their greedy eyes upon the Suwát valley, with the view of getting it annexed, not considering that we could not keep it, but at great expense and bloodshed, take care to spread. In all countries bordering upon each other, the criminals on either side seek to escape from justice by flying across the respective frontiers, as they did from England to Scotland, and *vice versa*, in former times ; and as they do to France and America, in the present day. It is not to be imagined, on this account, that the authorities of those countries



connive at such acts, much less the bishops and priests of those countries. Such too is the case in Suwát. The Akhúnd is high priest or rather a devotee, whom the people regard as a saint, and who is looked upon, by the people of those extensive regions around, as the head of their religion ; but he is without the slightest real power, either temporal or spiritual ; his influence being solely through the respect in which he is held.

It is in the villages on the outskirts of Suwát, and other places on the border, that bad characters, who have fled from justice, seek shelter, with whom the Akhúnd, as already stated, has no more to do than the man in the moon ; but parties, for their own purposes, make use of the Akhúnd's name.

The Suwátí Afgháns are so tyrannical, so prejudiced, and so fanatical, that even the admonitions, and the expostulations of the Akhúnd are unpalatable to them. Whatever they do not like, or whatever may be against the custom of their Afghán nature from time immemorial, they will neither listen, nor attend to. A circumstance which lately happened is a proof of this. A trader of Pesháwar, after great expense of time and money, had caused to be felled, in the hilly district above Suwát, about two thousand pine trees, which, in their rough state, were thrown into the river, for the purpose of being floated down to Pesháwar. When the trader and his people, with their rafts, entered the Suwát boundary, the Suwátís seized them, and would not allow the rafts to proceed. The trader supposing the Akhúnd to have influence, went and complained to him. The Suwátís of Lower Suwát, through fear of their chiefs, with whom the Akhúnd had expostulated about the behaviour of their people, gave up all the trees they had not made use of themselves, and they were not many ; but the people of Upper Suwát, that is to say, from Chárbágh to Chúr-rraey, on both sides of the river, would not obey, and did not ; and the trees may still be seen, lying about in hundreds, on the river's banks.

With the exception of a few servants, the Akhúnd, whose name is *Æabd-ul-ghaffúr*, has no followers whatever. He is of the Naikbí Khel (the Naikpee Khail of Elphinstone,) and left Suwát when a mere child. He resided in the Khattak country, at Saráe, at the *zíarat* or shrine of Shaykh Rám-Kar, where he remained as a student of theology until past his thirtieth year ; and was so abstinent that

it is said he could scarcely walk a hundred yards from weakness. This I have heard from Muhammad Afzal Khán, Khattak, who has often seen him there. When the Seikhs got the upper hand at Pesháwar, he left the Khattak country and returned to Suwát, and took up his residence at Saiydúgán.

I noticed that the Akhúnd's head shook a little, which unless cured, will probably turn to the disease named *lakwah* in Arabic, which is a spasmodic distortion of the face.

I had been led to believe from people generally, that the Akhúnd was possessed of some wealth—but it was very little, comparatively, that we saw; and that little was constantly expended,—that he was constantly employed, from morning to night, “with his fanatic subjects plotting in vain,”\* and occupied with the world's affairs. Instead of which I beheld a man, who has given up the world, a recluse, perfectly independent of every body; and occupied in the worship of God. Sometimes he comes out of his house for two or three hours daily; sometimes only every other day. At this time people come to pay their respects, the greater number of whom are sick persons. For these he prescribes some remedy, and prays over them, after which he again returns to his closet within his dwelling. If two parties chance to have a dispute, and they both agree that it shall be settled according to the *sharæ* or orthodox law of Muhammad; he explains to them the particular precept bearing on the case, from the Arabic law-books. Save this, he has no connection in the matter.

The food of the Akhúnd is a single cake or bannock of bread, made from the *shamúkah* (*panicum frumentaceum*), the most bitter and unpleasant grain it is possible to conceive, which he eats in the morning before dawn. He fasts during the day; and in the evening he eats sparingly of boiled vegetables sprinkled with salt. The only luxury he indulges in is tea, made in the English fashion, with milk added, as you yourself take it. About two or three hundred poor persons receive food at his guest-chamber daily; and the animals of those who come from a distance receive a measure of corn and some grass. He pays for all he obtains to feed these parties, in ready

\* Rev. J. Cave Browne: “The Punjab and Delhi, in 1857.” This author, at page 292 also states, “The Swat valley is inhabited by a warlike and fanatic race of Mahommedans ruled by a *Moulvie of Moulvies*, a patriarch or pope of the Mahommedans of this part of Asia, called the Akhoond of Swat.”



money ; yet, apparently, he has no income. The offerings of those who come to visit him are applied by his servants to this purpose ; and save a few buffaloes, which are gifts from others, from time to time, he possesses but few worldly goods, much less lands or revenues to plot invasion of empires. The milk, even, of the milch buffaloes is given to his guests ; and the males are also slaughtered for them. He himself receives no money from chief or noble ; but from the poor who visit him, he will receive their small offerings of one or two *pice* (farthings) to please them, and give them confidence.

The Akhúnd has a little garden attached to his dwelling, in which there are a few fruit trees, consisting of pomegranate, peach, fig, *ttángú*,\* walnut, and a vine. As the fruits come into season they are gathered, and a small quantity is placed in the guest-chamber or reception-room, daily. To those who express a wish to taste the fruit he gives a little with his own hands. His residence lies in a most healthy and salubrious situation ; and close by there is a running stream of cool and clear water. At the head of this stream a small pond has been formed, containing a few fish. There are also several plane and other shady trees about ; and it is, altogether, a very pretty place.

The Akhúnd has one wife, and a little boy about eight or nine years of age, and a daughter. On one occasion he was requested, by some of his particular friends, to make some provision for his family, in order, that after his decease, they might be provided for. He replied, “If they are true unto God, all that the world contains is for them ; but if they are untrue to Him, the nourishing of them is improper and unjust.” Indeed he is so much occupied in his devotions, that he has little time, even to show affection and fondness for his family.†

\* The name of a tree bearing a fruit like the apple in appearance.

† “On our northern frontier, in the Swat valley, the laboratory of Mahommedan intrigue, the right hand of the Alchemist was paralysed at the very moment when he had seemed to have attained the grand *eureka* of his life. The *Badshah* whom the wily Akhoond of Swat had raised, in order to gather under the green banner of the prophet every Mahommedan fanatic, and to recover Peshawar over the corpses of the unbelievers,—this creature king *died on the very day* that the tocsin of rebellion was sounded forth from Delhi ; and the fanatic fury which was to have overwhelmed Peshawar spent itself in civil war in the Swat valley.” Rev. J. Cave Browne, Punjab and Delhi, in 1857. Vol. 2nd, pp. 311. The *Badsháh*, a priest, not a king, here referred to, did not die for several months after the Delhi massacre.

Such is the true history, and such the faithful portrait of the terrible, fanatic, plotting Akhúnd of Suwát, the bugbear of Pesháwar.

That he made the mutineers of the late 55th Regt. Bengal N. E. Musalmáns is totally untrue. They fled into Suwát, and remained, as travellers generally do, for a few days, as his guests; but, at the end of this time, he advised them to make the best of their way out of Suwát, although Akbar, who is known as the Saiyid Badsháh, wished them to remain. In this case the Akhúnd indeed persisted that they should not be permitted to remain in Suwát; so the rebels set out towards Kashmír, on the road to which they were cut off by the Deputy Commissioner of Hazárah. Other mutineers also came from Murree, all of whom he dismissed as quickly as possible to Kábul.

It is necessary to explain who this so called Badsháh was. He was not an Afghán, but a Saiyid, named Muhammad Akbar Sháh, a native of Satánah (burnt last year by General Sidney Cotton) near Pakhlí, above Attak. Some years since the Akhúnd Sáhib, as the spiritual chief, was requested to appoint a Badsháh, that is to say a Saiyid, *not a king*, for the word means also a great lord or noble, or head man, but as a sort of high-priest, or rather legate, to whom the *zakát* and *aæashar*, certain alms, and a tithe sanctioned by the Kurán, might be legally paid; and who must be a Saiyid. He died about a year since,\* on which his son, Mubárah Sháh, wished to be installed in his father's place; but as the Suwátís were not willing to pay tithes, the Akhúnd declined to do so. All Saiyids are called Sháh or Mí'án; and Sháh and Badsháh signify a king also, but here it merely meant a high-priest. At Pesháwar, one hears of Gul, Badsháh, and there is a gate of the city called after him; but it does not follow that he was a king, for no such king ever did exist, any more than Saiyid Akbar Sháh was a king in Suwát. It was the word Sháh, no doubt, which has been magnified into Badsháh, as if the words could not possibly mean anything else than a king!†

\* August, 1857.

† On referring to Captain Conolly's "Notes on the Eusofzye Tribes," already referred to, I find, that the king of Suwát, set up specially by the Akhúnd, for the Delhi tragedy, existed twenty years before. I copy Captain Conolly's own words—"The tribes of Booneer and the neighbouring hills, may be said to



The person referred to by Captain Conolly under the name of Muríd Sáhib Zádah, was quite a different person to the Akhúnd, and was an inhabitant of the town of Ouch. The word "Ouchand," in the article you refer to\* is an error; but is probably intended for the plural of Ouch—Ouchánah, as there are two villages adjoining each other, of this name, which are well known. This person, whom he referred to, has been dead some time. His descendants still live at Ouch, but none of them are any wise remarkable for piety or worth.

To return again after this long digression to the journey before us, after we had paid our respects to the Akhúnd, I wished to proceed on my journey; and as the time of the KHÁN SÁHIB had expired, he made me over to the Saiyid I mentioned on a former occasion, and he also left with me one of his trusty and confidential followers. He himself returned to Pesháwar.

A little higher up the valley of Saiydúgán from this, towards the east, lies the village of Islám-púr which was the residence of Mí-án Núr, the grandson of Akhúnd Darwezah, upon whom Khushhál Khán, the renowned Khattak chief and poet, launched his bitter irony in his *kasidah* or poem on Suwát; and here also, the tomb of the Mí-án may still be seen.

On the 26th August we set out from Saiydúgán, by ascending the *kotal* or Pass of Shámelí, which lies to the north-eastward of the village of Míngawarah, and nearer to the river. This village contains a great number of Hindú inhabitants; so I went there to see whether I could secure any ancient coins. I saw several, but they were not such as I required.

After proceeding a further distance of about three miles, we reached the village of Manglawar, which is situated at the entrance

have no chiefs of any importance, the only individuals possessing influence being a family of Syuds, the descendants of Peer Baba, a celebrated saint, who lived in the time of the Emperor Humaioon.

"Of this family, there are three principal branches amongst the Eusofs. The representatives of the elder and most influential branch are, Syud Azim and Syud Meeah of Tukhtabund, the capital of Booneer, who may be compared to the Abbot Boniface and Sub-friar Eustace of the novel; Syud Azim, the elder, a good-natured, indolent character, having willingly resigned his authority to his more active and talented brother. The second branch is SYUD AKBAR, Meeah, of SITANAH on the Indus; and the third, Syud Russool of Chumla."—*Bengal Asiatic Journal*, for 1840, page 929.

\* *Bengal Asiatic Journal*, for 1839, page 929.

of a small valley, of the same name, running to the N. E. At this point also, the river has approached very near to the spur from the mountains, over which lies the Shamelí Pass, just referred to, so much so, that there is no passage into the central part of the Suwát valley in the hot months, when the river is at its height, by any other road; but in winter there is a practicable road along the river's bank. I examined all the Pushto books in this village which I could get hold of, but they were all on divinity, and not one with which you are not acquainted; such as *Makhzan-ul-Islám*, *Fawá'id-ush-sharri'ah*, *Jannat-i-Fardous*, *Durr-i-Majális*, &c. At this place also there are some ruins on the mountains to the east, but they are few, and can only be distinctly traced on ascending the mountains; but there are no houses or walls standing.

Manglawar, also, is very pleasantly situated, with streams from the mountains running past it, together with a great number of umbrageous plane trees like those at *Tárrnah*. Here also I obtained a copper coin, which I bought.

Proceeding onwards we reached the village of *Chhár-bágh*, and made inquiry after the principal books I had come purposely to seek, in the houses of the *Míáns* or *Saiyids*; but those I sought were not forthcoming. Continuing our journey for about four and half miles, in a direction between north and west from *Chhár-bágh*, on the river's bank, we reached the *Kábul-grám*, about four and half miles further on, and thence onwards, passing several small *bánddas* or hamlets, we reached *Khúzah Khel*, where we stayed the night; and I again made inquiries about Pushto books, but could obtain nothing new. The air at this place was very chilly; and the valley began to contract very considerably. There were no *Hindús* in the village; and the *Paránchas* were the only tradespeople and shopkeepers to be found so far towards the upper part of the valley. Here the rice fields, too, ceased; for the banks of the river began to get very high and steep. The land on which this village stands, as well as others on the left bank, facing the north, is high. Some are situated on a spur from the hills, and others on more level ground, or on small plains, at the very skirt of the hills; but the ground is not level until the river's banks are reached; for the land resembles the back of a fish. The banks of the river, on both sides, sometimes slope down to the water's edge, sometimes are steep and scarped



like a wall almost, but not often. Where steep, the height of the banks is about eighteen or twenty feet from the water; but the ground, on which the villages generally are situated, is about half a mile or so from the banks, and is generally from one hundred to one hundred and fifty feet about the level of the water, but sloping gradually downwards.

On the morning of the 27th August, we again set out up the valley; and passing the villages of Sherrn-i-bálá and Sherrn-i-pá'in, and Khúnah, we reached Petaey and Binwarri. At Petaey we found it so excessively cold, that one could not drink the water with any degree of comfort. I ventured to enter the river for a few paces, but soon had to come out; and was glad to stand in the sun, on the rocks, to get warmth into my feet again. The people were sitting in the sun for warmth; and all slept inside at night, it being too cold to sleep outside, although this was the month of August, the hottest in the Pesháwar valley. I saw snow on the mountains about ten or twelve miles off.

At this village I also, for the first time, met some of the people of the mountain districts to the north of Suwát, together with some of the Gilgitt people also, who had come here to purchase salt. They were all clothed in thick woollen garments, coats, trowsers, caps and all, but wore sandals on their feet. They were, in appearance, something like the people of Badakhshán; and although, to look at, not very powerfully built, yet they carry loads equal to that of an ox of this country (Pesháwar and the Panjáb). I could not understand any of the words of their language,\* save that they called salt *lún* which is Sanskrit लवण. The salt is brought here by the Khattaks from their own country, for sale; and the people of the Kohistán, to the north, near which Petaey is situated, come down as far as this place to purchase it.

In the vicinity of this village the peculiar gravel called *charata'i*, before referred to, is found in great quantities. The people called it *gitta'i*, which is Pushto for gravel in general. Here too, the valley is not more than half an English mile across, even if so wide; and the banks of the river are very high. The fields are few, and the extent of cultivation insignificant.

\* The writer is well versed in Urdú and Pushto, and Persian is his native tongue.

There are more mills in this part of the valley than in any other part of Suwát. Great quantities of honey are produced here also. The Suwátís make dwellings or hives for their bees, and take great care of them. The hives are thus made. They place a large earthen pot in a *ták* or niche in the wall of the house, with the bottom of the pot towards the outside part of the wall, and the mouth level with the interior part of the wall of the house. They then plaster all around with mud, so that the pot may not fall out of the niche. The mouth is then closed with mud, that the bees may enter from the hole made for them in the bottom of the pot, which is turned outside. When the pot is well stored with honey, the bees having taken up their residence in it, the mouth of the pot, which has been closed with mud is re-opened from the interior of the house, and a piece of burning cow-dung, that smokes, is applied thereto. On this the bees go out, and then the hand is inserted, and the honey removed; but some of the comb is allowed to remain for the bees. The mouth of the pot is then closed up again.

Scarfs called *shálaka'í* both white and black, are woven here in great numbers, which are exported for sale to Pesháwar and other parts. This part of Suwát is also famous for its fruit, every description of which comes into season earlier in this vicinity than in any other part of the valley.

The complexion of the people of Upper Suwát is quite different to that of the people lower down the valley; and the men are generally fair and good-looking. I also saw some females of Káshkár, and the Kohistán, to the north of Suwát, at this village, who were very handsome indeed. The women of the villages, along the river, in this part of Suwát, go out every morning to bathe, during the summer months; and numerous bathing machines have been built for their convenience. These consist of four walls of mud, or mud and stone, and of sufficient height to conceal the bathers. The men, also, use them; but they are intended for the exclusive use of females in the mornings. These places are called *chár chobaey*.

The villages in this portion of Suwát are much smaller and more scattered than in the central parts of the valley; and the people of each village are generally at feud with each other; and, consequently, little or no intercourse takes place between them.

I should mention in this place, that from Tárrnah to Chhár-bágh



the ground rises gradually, and thence to Khúzah Khel still more so; and that at every hundred paces almost, the difference can be distinguished.

From Petaey we proceeded onwards about three miles to Pí'á, the ground rising considerably and abruptly until we came to this village, the last held by the Yúsufzí Afgháns in the northern extremity of the Suwát valley, which here terminates. Beyond the country is called the Kohistán, which is, however, the Persian word for Highlands; generally used throughout most parts of Central Asia to designate all mountainous tracts. Between this and Petaey also, the river foams and boils along with great impetuosity; and is more considerable than the Arghandáb river, near Kandahár, even when at its greatest power and volume.

About four or five miles further up the valley, beyond the Yúsufzí boundary, there are a few hamlets, the two principal of which are called Chur-rra'í, on this bank, and Tírátaey on the opposite side. These villages are inhabited by the descendants of the celebrated Akhúnd Darwezah, the great saint of the Afgháns, and successful opponent of Pír Roshán, the founder of the Rosháníán sect. It appears that the whole of Suwát, as far north as Pí'á, was conquered in Shaykh Malí's time; but these few villages just referred to, were acquired from the Káfirs (as all people are termed by the Afgháns, who are not of the same faith as themselves) about a hundred and fifty years after, in the time of Akhúnd Karún Dád, son of Akhúnd Darwezah. At the capture of Tírátaey Karún Dád lost his life.

I was informed by the people here, that some years since, a number of dead bodies were discovered, buried in a mound at the side of a hill, near Tírátaey. The bodies were quite perfect as if but recently dead; and had been buried with their arms, consisting of bows and arrows, axes, and swords. They were removed and re-interred along with their weapons, in some consecrated spot. When I heard this, the thought struck me that you would desire to possess specimens of these arms, but I could not obtain any without having one of these burying places opened, which, amongst such bigoted people, was dangerous and impracticable.

The people of Tírátaey also told me, that they possess the body of Akhúnd Karún Dád; whilst the people of the village of Kánjúán affirm that when he fell fighting against the Káfirs, he was buried

in their village. The reply of the Tírátæy's to this is, that they stole the body from Kánjúán, and carried it off to their own village and buried it there. All such statements as these are solely for their own interested purposes, in order to enable them to peel off the skin and flesh of poor people, in the shape of offerings at the shrines.

Having now reached the boundary or extremity of Upper Suwát, beyond which I could not then penetrate, we began to prepare to cross the river, and return home by the opposite bank ; but before giving an account of our homeward journey, I will here give you the information I gained respecting the country beyond, up to the source of the Suwát river, which I obtained from an intelligent Afghán who passed several years there.

After leaving Pí'á, the boundary of Upper Suwát, the first village is that of Chúr-rra'í, beyond which the Pushto or Afghán language ceases to be spoken, and the Kohistání language is used. The first village is Birán-yál inhabited by Tor-wáls, which is situated on the left or western bank of the Kohistán river as the river of Suwát is also termed. The distance between this village of Birán-yál and the village of Chúr-rra'í is about eight miles, from the first of which the Kohistán may be said to commence. The people here too understand Pushto. From this to the extremity of the valley, at the mountain of Sar-dzáey, is a distance of seventy-five miles ; but the valley is so narrow that a stone thrown from one side reaches the other ; in short it is about a bow-shot across. The whole of this space is occupied by two tribes ; first the Tor-wáls, sometimes also called Rúd-báris ; and above them again, the Gárwí tribe. The amount of the former is about 9,000 adult males, and the Gárwís about 3,000. Hence it will be seen, that this district is densely populated. The villages inhabited by Tor-wáls, from south to north, are ; Birán-yál, to the west of the river, eight miles from Chúr-rra'í ; Haranaey, to the east of the river, about twelve miles from Chúr-rra'í ; Cham, to the west of the river ; Gornaey, to the east of the river ; Chawat-grám, to the west ; Rámett, to the east ; Chúkíl, to the east ; Ajrú-kalaey, to the west ; and Mán-kiál, to the east,—these belong to the Tor-wál tribe ; and Pash-mál, to the west ; Har-yání, to the east ; Ilá-hí-kott, to the west ; Ushú, to the east ; Kálám, to the west ; and Utrorr, to the west, belong to the Gárwí tribe. After this, still proceeding north, are the three villages of the



Gújars, called the *Bánddahs* of the Gújarán, one of which is Sar-bánddah, inhabited by about fifty families. It is close beneath the mountain of Sar-dzáey, the barrier closing the extremity of the valley to the north. The three villages contain, altogether, about six hundred houses.

A short distance to the south of Sar-bánddah, there is a marshy, meadow-like plain of some extent, probably about fifteen jaríbs of land.\* This is called Jal-gah. This term is evidently derived from Sanskrit and Persian; the first being जल water, and the second & a place, “the place of water or streams.” The rivulets issuing from this meadow having collected together, flow downwards towards the south; and this Jal-gah is the source of the Suwát river, which, united with the Indus, and the Panjab rivers, at last, pours its water from scores of mouths into the mighty ocean at Kurrachee, (or more correctly Karáchí) in Sindh, after a course of some fifteen hundred miles!

Flowing south, the stream, called the water of Jal-gah, enters the boundary of the Gárwí tribe; and thence flows on to Ut-rorr, which lies on its western bank. Thence under the name of the river of Ut-rorr it flows down opposite to the entrance of the *darah* of U'shú with its river, lying in a north-easterly direction, and unites with that stream near the village of Kálám, also on the western bank. Still lower down it receives the river of Chá-yal running through the *darah* or valley of that name, lying in a south-westerly direction, near the village of Shá-grám on the western bank. East of the Ut-rorr river, as it is termed from Shá-grám downwards, and about half a mile lower is the village of Chúr-rra'í, where its name again changes; and it is then known as the *sind*,† or river of Kohistán. On reaching the villages of Píá and Tírátaey, it receives the name of the Suwát river, having during its course received, little by little, the small rivulets on either side.

At the extreme head of the valley, near the mountain of Sar-dzáey there is a Pass leading into Káshkár; another road leads through the *darah* of U'shú, on the eastern side, into Gilgitt; and another leading into Panjkorah through the Chá-yal *darah*.

\* A jarib of land is sixty yards in length and breadth.

† A Sanskrit word, used in Pushto.

Throughout the whole of this valley, from Sar-bánddah to the boundary of Upper Suwát, there are immense numbers of trees, both along the river's banks, and on the mountains on either side, to their very summits. The trees mentioned as having been seized by the Suwátís, in a former paragraph, were felled in this valley, to be floated down to Pesháwár. I saw one of the party who had gone to fetch them, and he informed me that trees, some of which were large pines, only cost, in felling, from three-pence to two shillings each.

The wild animals of this upper portion of the valley of the Suwát river are numerous; consisting of tigers,\* bears, and monkeys, in great numbers, particularly the latter; wild boars, gazelles, a large species of deer, wild bulls, hares, foxes, wolves, and jackals without number. The mountain sheep is also common, as well as the musk-deer, called *rámúsi* by the Afgháns and Kohistánís.

The flocks and herds consist of bullocks, cows, sheep, mules, and numbers of goats. There are also hogs, *brorrahs*, (a species of wood-louse), and fleas in swarms. Indeed it is said the fleas of this part are more numerous than those of Suwát, from which, Heaven defend us!

The dress of the Kohistánís consists of garments woven wholly from *pashm*, the peculiar wool or fur of these parts, with which several animals are provided. They do not wear shoes, but twist strips of the leather of cows or goats about the feet and legs as far as the knee, but the feet are protected by sandals, the two great-toes being left bare. The women dress similarly to the men, with the exception of the covering for the legs.

The people are very fair and comely; and the women, who go about unveiled, are very handsome.

The cultivation depends upon rain. They do not use the plough, but a kind of hoe or mattock, to turn up the land with, or otherwise make holes in the ground, into which the seed is inserted. Wheat and barley are by no means plentiful; but *joúrí* (*holcus sorgum*) is.

Fruit is more abundant in the Kohistán than in Suwát, but much of the same description. The winter is severe; and snow falls in great quantities.

The Suwátís import grain; and thread, needles, and coarse blue cotton cloths from Pesháwar; and salt from the Khattak country is imported into the Kohistán.

\* Leopards probably.



The following customs are observed as regards hospitality. Whenever a guest, that is to say a traveller in general, or a stranger, reaches the *hujrah*, or apartment set apart for the reception of guests, in the same manner as throughout Afghánistán, it is necessary that one of the attendants who has charge, should warn the person in the village, whose turn it is to supply the guest with victuals; for all have to do so in turn. If the guests should require more than this person has it in his power to furnish, the next party, whose turn may follow, is also warned to supply the guests. Should a great man arrive, such as a Khan or Chief, or a Saiyid, or the like, with twenty or thirty persons in his train, the kettle drum at the *hujrah* is beaten to give notice that lots of meat and clarified butter are required for their use. On this every person who has any meat of rather too high a flavour to be very palatable to himself, gives due notice that he has some; and this is either taken to the *hujrah* to be cooked, or the person who supplies it, cooks it, and sends it to the *hujrah* for the use of the guests. They do not eat fresh meat in the Kohistán, but leave it to hang until it becomes very high,\* or almost rotten, and then cook it. Fresh meat, they say, is the food, not of men, but of ravenous beasts.

After this long digression we may now return to Pi'á, the northernmost village in Upper Suwát.

As there was no raft at this place, (for such a thing as a boat is not known) we had to return our steps down the river, a short distance, to Banawrrí where we found one, and crossed over to the village of Landdaey, which is about two hundred paces from the right bank, the breadth of the stream at this ferry being about one hundred yards. The banks were very steep here, and the river was very deep. I observed that where the river was deep, the banks were steep and scarped; but where the water spread out, the banks were like the sea-shore, more sloping, and gravelly.

Having now reached the opposite bank, we began our journey homewards through that part of Suwát lying on the right bank of the river, and known by the name of *lánwdah* or the moist. On the 30th August we left Landdaey, where I obtained a copper coin which seemed something new, and proceeded to the village of Darwesh Khel-i-Bálá or the higher, about eight miles distant, passing

\* Like game amongst the fashionables of England.

several small *bánddahs* or hamlets of four or five houses by the way. The ground all along our route, which lay at the skirt of the mountains, was very irregular and hilly; and the cultivation was very scanty. A rivulet runs through this village, which is shaded by a number of fine trees, under whose shade there are mosques, and *hujrahs* (cells or closets they may be termed) for *tálíbs* or students, of whom many come here to study; and, altogether, it is a very picturesque and pleasant spot. At this place we were very much distressed and annoyed by the Malik or headman, and a Mullá or priest, both Suwátís. The Malik wished to take away my clothes and papers; and the Mullá ordered me to show my papers to him. There is no doubt but, that, in case I had shown him my papers, and he had seen what was contained in them respecting Suwát, we should have been all three lost. By great good luck, however, some guests happened to arrive just at the time, and occupied the whole of our persecutors' attention. This we took advantage of, to make ourselves scarce with all speed, and reached Darwesh Khel-i-Pá'in or the lower, some distance from the other village. Here we halted for some time to rest ourselves; and I made inquiry about books and old coins, but without success. I found that the *Shálaka'í* or woollen scarfs I before alluded to, both white, black, and flowered, are manufactured at these two villages, just mentioned. We proceeded from thence to Banbá Khelah, which faces another village called Khúzah Khelah, distant about a mile and half on the opposite bank. Most of the villages in Suwát can be seen from each other, save a very few, such as Khazánah, and Garraey, which lie to the west of the spur of Súe-galí; and Saiydúgán, and Islámpúr, which are situated in the *darah* or valley bearing the latter name; for, in the whole of the centre of Suwát, there is neither mound nor hill to obstruct the view. It is indeed, a most picturesque valley; in the centre is the river branching out with the green fields swelling gently upwards, on both sides, until they melt, as it were, into the lower hills. Here I obtained two square copper coins, duplicates, but the impressions were distinct.\* I was told on inquiry, that when the people go to the hills for grass, they search about for old coins, near the ruins they may pass, or sometimes they go purposely to search for them, and dispose of what they find to the Hindús.

\* Coins of Apolodotus.



Passing this place, we came to Banbá Khel-i-Pá'in, or the lower; and from thence went on to Saubat and Kharerra'í, the people of which were at feud, and were fighting amongst each other. On reaching Shakar-darah in the evening, we were told that they had, that day, lost some twenty, in killed and wounded, on both sides. After staying for the night at Shakar-darah, on the morning of the 31st August we set out from thence, and proceeding through the pass of Nún-galí over the spur, (consisting of earth mixed with rocks and stones, containing something of a yellow colour,) which juts out abruptly for about three quarters of a mile, to one of the branches of the river, from the mountains on our right hand, we again descended to the village of Nún-galí, which lies under the southern side of this spur near the river, and just opposite to Chhár-bágh on the other side, which can be distinctly seen. Passing on from this village, we came to Bánddí-i-Bálá, and Bánddí-i-Pá'in the former of which after Tárrnah and Munglawar, is the largest place in Suwát. Leaving these we passed on to Kánjú-án, where the shrine of Akhúnd Karún Dád, son of Akhúnd Darwezah, is situated, and to which I went to pray. Continuing our journey we came to Damghár, and Díw-lí; and then went on to Akhúnd Kalaey,\* where is the tomb of Akhúnd Kásim, author of the Fawá'id-ush-Sharriæat.† His descendants still dwell here. Damghár is the place mentioned by Khushhál Khán, in his "Ode to Spring," which is contained in your translations of Afghán poetry.‡ We now proceeded onwards through the Súa-galí Pass, towards the mountain of Súa-galí, another spur from the same mountains, which juts out towards one of the branches of the river, and then, for a short distance, turns abruptly to the south. The length of the *kotal* or pass is about twelve miles, the first three of which was a pretty good road; the next three miles are very difficult; and the remaining six, as we had to descend, were not so very difficult, but would have been so to ascend. The air was so cool and pleasant, that we accomplished this difficult journey between ten in the morning and three in the afternoon, the hottest part of the day, without experiencing any inconvenience from the sun,

\* Kalaey is the Pushto for village.

† The title of a celebrated Pushto work, part of which will be found in my *GULSHAN-I-ROH*.

‡ "SELECTIONS FROM THE POETRY OF THE AFGHÁNS, translated from the original Pushto:" London: Williams and Norgate, 1862.

although we were on foot and brought no water with us; and this too on the last day of August, the hottest of the hot months in the Panjáb and at Pesháwar. On ascending the Pass, and about two and half miles from the commencement of the ascent, we came to a *zíarat* or shrine, with a rivulet running past it, and shaded by fine *zaitún* or wild olive trees, an immense forest of which, the largest in the whole of Suwát, and reaching to the summits of the mountains, here commences. On reaching the crest of the Pass, and looking downwards we could see the village of Garraey, which we passed, and proceeded on to Khazánah, the men of which are the strongest in Suwát. At this place also, we met a very pretty young woman, who, I remarked to my companions, was the first good-looking one I had seen in the Suwát valley. We still proceeded onwards, and reached Zírah Khel, which lies just opposite to the Sanddakaey mountain on the other side of the river. From thence we went on to Ouch-i-Bálá, and Ouch-i-Pá'in, both of which villages, lying close to each other, are situated just inside a long narrow valley, containing water, through which a road, which is always open, leads into Bájawrr. There is another road by way of Lower Suwát, but this one is preferred.

Here we passed the night in company with a *káfilah* or caravan of Khattak traders; and in the morning, which was the 1st September, we were conveyed across the river from the ferry near the village of Chak-darah, where Kokal-tásh, the general of the Mughal Emperor Akbar, built a fort to overcome the Yúsufzis of Suwát, to Allah-ddandd, thus leaving the *lāwndah* or moist part of Suwát, and entered once more the *wuchah* or dry district. There were no traces of ancient ruins near the former village.

Allah-ddandd is the residence of the chief of the Rárrnízí branch of the Yúsufzí tribe, and the residence of the chief, Sher-dil Khán, son of Æinayat-ullah Khan (mentioned by Conolly in his notes on the Yúsufzís). He is a young man about twenty-three years of age, and is a lineal descendant of Khán Kajú, or more properly Kachú, the chief of nine *laks*\* of spear-men, in the days of Sher Sháh, Lúdhí, Emperor of Hindústán, and the author of a valuable history of the conquest of Suwát by his tribe, some few years previously. Notwithstanding his proud descent, however, and that Afgháns, generally,

\* A *lak* is 100,000.



are so well versed in their own genealogical lore as to be able to relate their descent *vivá voce*, for five hundred years or more, this chief does not know the names of his ancestors, nor the number of generations between Khán Kachú and himself! After this specimen, it is not very astonishing, that Mír Æalam, Chief of Tárrnah, did not know how he stood with regard to Hamzah Khán, his own great ancestor.

From the writings of Khushhál Khán, the renowned chief of the Khattaks, in the reign of Sháh Jahán and Aurangzeb his son, we find that the descendants of Khán Kachú were several times dispersed; hence their present comparative diminution of power, and smallness of territory, and want of worldly goods.

The most celebrated and powerful chiefs of Suwát, indeed the two families who exercise the chief power over the whole valley, are those of Tárrnah, already mentioned, and the chief just named; otherwise all Afgháns are Kháns, particularly when from home, or on their travels. My business here, too, as you are aware, lay more with Mullás; and I endeavoured to avoid the chiefs as much as possible. At Allah-ddandd, however, Suhbat Khán, son of Hukamat Khán, Shér Dil Khán's brother, has also a portion of the Rarrnzí country; but he is four or five years older than his nephew, who is the chief of this branch of the Yúsufzí tribe.

The tomb of Khán Kachú is at Allah-ddandd, also that of the famous Malik Ahmad, who took so prominent a part in the affairs of the Yúsufzís, from the time of their being expelled from Kábul by Mír Ulagh Beg, grandson of Tímúr-i-lang, up to the time of their conquest of Suwát and Panjkorah, and other districts about Pesháwar, which some have stated to have been theirs, already in Alexander's day.\* I could not discover any thing about Shaykh

\* Major J. Abbott in his "Gradus ad Aornos," (Journal for 1854,) quoting Arrian, with reference to the siege of Massaga, states: "The enemy had 7,000 mercenary troops of the neighbouring districts (*the Rohillas, probably, who still swarm in that neighbourhood.*)" Again: "By the 3rd and most obvious route crossing the Nagooman at Lalpoor, he would have threaded the Caroppa Pass, have entered and conquered the Doaba of Shub-gudr, have crossed at Ashtnugr the river of the *Eusufzyes*, or as they still call themselves, *Asupzye*, *Aspasioi*, i. e. *the Issupgwur*, and would have found himself in the country of the *Aspasioi*!" Surely Major Abbott knows that ROHILLAHS are AFGHÁNS, and that their country is called ROH; and if the Yúsufzís only reached Kábul in Ulagh Beg's days, and years after conquered Pesháwar and Suwát, it is evident they could not have been there in Alexander's days, any more than the Normans, who conquered the Saxons at Hastings, could have been in England, in the days of Julius Cæsar.

Malí, or his descendants. I here heard, however, that the book I was in search of, and for which I had chiefly undertaken this journey—"The History of the Conquest of Suwát," by Shaykh Malí—was in the possession of Mí-án Ghulám Muhammad of Tsaná-kott, and that whenever there is any dispute between families, respecting the right to lands, they get the book, which contains an account of the distribution of the whole of Suwát by the Shaykh and Malik Ahmad, at the conquest; and as the book shows they agree to without further dispute. I was quite elated at this piece of good news, and wished to set out forthwith for Lower Suwát; but those who accompanied me did not agree, as they had no acquaintances there; and, moreover, that part of the country was in a disturbed state. I urged upon them that we had but eight or nine miles remaining, which we could get over in a few hours; but, all I could do, I could not induce them to go. Having no help for it, I dismissed the Suwátís who had accompanied us so far, and set out with Nek Muhammad, the confidential clansman whom the KHÁN SÁHIB left with me, and proceeded towards Butt Khel, and thence passed on to the village of Shair. Here I took counsel of my trusty companion, and proposed that we should proceed alone, to Tsaná-kott. He said he would go wherever I wished, but he had one thing to mention, and that was, as follows. "In the first place, we have no excuse to make for this journey, if obstructed or annoyed. We could not state that we are going to pay our respects to the Akhúnd, or that we are students going to read with some teacher in his vicinity. Here such excuses are not likely to be listened to, and trading would be the only plea available; whilst, at the same time, we have no goods to trade with. The best way to put off this new journey for another opportunity, when the KHÁN SÁHIB has promised to accompany you for a period of two months, and then we can see all the country." This advice of my companion was sound, and I acted accordingly; so we set out on our return to Pesháwar by the Mala-kand Pass.

This Pass is much less difficult than that of Morah, by which we entered Suwát. About half way up the northern side of the Pass there is a spring of cool and pure water, round which the spikenard plants flourish most luxuriantly; indeed, throughout Suwát, wherever there were springs or rivulets, I observed they were surrounded by



these beautiful plants. The mountains round this part of Suwát are, also, more densely wooded, than about the Morey Pass, with forests of pine and *zaitún* or wild olive. On the summit of the Pass there is a large open plain, and here there are several *kandahs* or trenches in which a number of bodies have been buried. I have been informed, that there are fissures in many parts of these *kandahs*, where hundreds of skulls may be seen, as also arrows, swords, knives, &c. It would appear that some great battle had been fought here when the Yúsufzís first invaded the country, and that the slain were buried on the field of battle; and what is more natural than to suppose that the people took post in the Malakand Pass, to resist the invaders? \* On the southern side there are no rivulets; and no water is procurable, save from two wells which have been dug between the village of Dar-gaey and the foot of the Pass. Near one of these wells there is another road, apparently very ancient, over Malakand, the whole of which to within a short distance of the summit, is built up with slabs of stone and lime; but like that of Khandállah, between Bombay and Poonah, it has many turnings and zig-zags, and thus appears to have been scientifically designed; but although it is the shortest way, with all its turnings, the Afgháns prefer using the other road.

They say, that there is another road into Suwát, still easier, by the Sháh-kott Pass, which is comparatively straight and level; and appears to have been a regular made road, probably the work of the former inhabitants of these regions, who, from the ruins that still remain, appear to have attained a considerable degree of civilization. Guns could easily be taken into Suwát by this route; but the Afgháns, apparently, to provide against such a contingency, have broken up the road in several places; and at present it is never used.

There is no place named Kandárák, at the foot of the Karakarr Pass into Suwát, to be found at present; but the ruins of a village, or something of the kind, may be traced. Perhaps this is the place referred to in the Akbar Námah, the scene of the defeat of Akbar's army by the Yúsufzí Afgháns. I was informed, that about three years since,

\* The history of the Yúsufzís and the account of the conquest of Suwát I have found in a work in the Library of the India House; written however in a most strange manner, in Pushto and Persian. The author was an Afghán; and he goes on to relate in Persian, and then all at once breaks into Pushto and *vice versa*.

three Afgháns found a phial, or something of the kind, near this place, the mouth of which was closed with lead, and contained several seals regularly cut. They appear to have been glass or crystal. An iron oven was also found at the same time. The Suwátís say, that the army of the Mughals were defeated in the Sháh-kott Pass; and will not allow that Akbar's army ever entered Suwát itself. I was equally unsuccessful regarding the other places mentioned in the history referred to, viz.; Iltimsh, Saranyakh, and Kandárí. I imagine they must have been more to the north-west, towards Káfir-istán.

On reaching the foot of the Pass we went on to Dar-gaey three miles distant; and thence proceeded to Sháh-kott, about two miles further. We had now entered the British territory; so I went on direct to Pesháwar: and here ended my travels in Suwát.

I must now attempt to describe the features of the valley.

On descending from the Mohrey Pass, and issuing from the narrow valley in which Nalbánddah lies, towards Tárrnah, the Suwát valley appears to lie almost east and west. It then makes a bend in a north-easterly direction as far as the Pass of Shámelí; and from thence to Pí'á the direction is almost due north; and beyond Pí'á again up to the source of the Suwát river, at the *Jal-gah*, it diverges slightly more in an easterly direction. It will therefore be seen, that the Suwát valley is divided, as it were, into three natural divisions; and where the three turns, above mentioned, commence, the valley gradually narrows by the mountains on each side converging together, and then opens out again by their receding. The river intersects the valley throughout, with occasional considerable bendings; but the several maps you have are incorrect,—indeed, almost wholly so as regards the country beyond the Mohrey Pass. The map in Elphinstone Sáhib's book, is better. The mistake is, that the valley in all these maps, is made to run, almost in a straight line north-east, and south-west; and from them it would appear, that a person standing at the highest part of the valley could see down straight through it, which is far from being the case.\* The river receives a few considerable streams, as has been previously stated, together with many small rivulets, from the mountains on either

\* The accompanying rough map is based on Lieut. (now Major) J. T. Walker's, as far as the Mohrey Pass, which he has so far surveyed.



side. From Chúr-rraey to Binwarrí, which was the nearest point towards its source which I visited, the stream is about a hundred yards broad, very swift, and violent. From about five miles lower down than Binwarrí it becomes somewhat wider, but is just as rapid and violent as before, till it reaches Darwesh Khel, about three-quarters of a mile lower down than which, where the valley also opens out considerably, it becomes much broader, and divides into several branches, and so continues until it reaches Allah-ddandd in Lower Suwát, where the branches again unite. From thence the river becomes narrower, until it joins the Malízí river (the river of Panjkorah of the maps), near the village of Khwadar-zí, in the country of the Utman Khel.

No gold is found in the river or its smaller tributaries, unless it be at their sources; and there are few or no trees on the river's banks, in the whole of the lower parts of the Suwát valley, not a hundred altogether I should say, save in the smaller valleys running at right angles to it. Here and there, one or two may be seen, in fields near the banks, under which the peasants rest themselves, and take their food in the hottest part of the day. It is in the mountains, on the sides of the valley, that trees are numerous.

The mountains on either side as seen from the broadest part of the valley constituting Lower Suwát are of different degrees of elevation. The first, or lower ranges, are of no great height, and of gentle ascent; and the second are rather more abrupt; and on these there are, comparatively, few trees, but much grass. The third or higher ranges appear like a wall; and that to the north is densely covered with pine forests, which are seen overtopping all.

Firewood is scarce in the lower parts of the valley, and the dung of animals is used instead; but in those smaller valleys at right angles to, and opening out into that of Suwát, there are woods and thickets enough. There are no shrubs or wild trees, such as we call jungle in India, in any part of Lower Suwát, save in these smaller valleys, and in the higher ranges which I did not reach; and therefore I cannot speak confidently on that subject.

The Suwát valley, not including the Kohistán north of Píá, is, according to Shaykh Malí's arrangement, divided into two parts, known as *bar* or Upper, and *lar* or Lower Suwát, which two divisions are thus defined. From Mányár to the village of Tútakán towards

the mouth of the river, it is termed Lower Suwát; and from Mányár northwards to Pi'á is Upper Suwát. Lower Suwát is hot, and produces little in the shape of fruit, but grows plenty of rice; has numerous villages; and is densely populated. Upper Suwát again is cold, and the climate temperate; but it has few rice-fields; produces much fruit; but has fewer villages, and is less densely populated than the other part of the valley. I heard of no part termed middle Suwát, which you say is mentioned in Elphinstone's book, and those of others; the only divisions beyond the two I have named are not recognized, unless we take the boundaries of tribes and *khels* as such; but the people of a country know best about such matters; and I have stated accordingly. No Suwátí would know what middle Suwát means.

In Lower Suwát rice is extensively cultivated, whilst in Upper Suwát, wheat, barley, and *bájrí* are the chief grains. As regards temperature and excellence of climate, picturesque beauty, fruits, and game, Upper Suwát, from Munglawar to Chúr-rraey, which I saw myself, is by far the best. The Kohistán beyond is much the same. The whole of the upper portion of the valley is intersected, at right angles, by the most picturesque little vales, of about half a mile or less in extent, the very residence in which would be sufficient to make a man happy. Each has its own clear stream running through, towards the main river; and their banks, on either side, are shaded with fine trees, many of which bear the finest fruit, and beneath which, every here and there, there are fragments of rock where one may sit down. The hills on both sides, up to the very summits, are clothed with forests of pine, whose tops yield a most fragrant smell. Dust is never seen.

The Suwátís, of Lower Suwát sow all the available land near the river with rice; and that nearer to the hills with *joárí* (*holcus sorghum*), cotton, tobacco, *másh* (*phaseolus max*), *úrrd* (*phaseolus mungo*), and *pález*, consisting of melons and the like. The higher ground, still nearer the hills, they have appropriated to their villages and burying-grounds; and numbers of villages, for this reason, have been built close to the hills. However, where the river, in its windings, encroaches more on one side than the other, that is to say, when the river approaches the hills on the right, or *lánwdah* side of the valley, the left, or *wuchah* side is more open and expansive; and



here the villages will be found lower down towards the centre of the valley. These villages lying lower down have from the windings of the river, and the different branches into which it separates as already stated, streams of water running through them, very often, indeed, more than there is any need of. The villages at the foot of the different hills also, have, generally, small streams flowing close by towards the main river.

From Allah-ddandd to Chhár-bágh on the *wuchah* side of the valley; and from Chak-darah to Bánddí on the *lánwdah*, which places face each other, the villages are small and very close together; whilst lower down the valley towards the south-west, and higher up towards the north-east, the villages are larger, and at a greater distance apart, often from two to three miles.

In the more elevated parts of the valley, where rice is not cultivated, the land lying between the villages and the rise of the mountains, is set apart for wheat and barley, and is dependent entirely on rain for irrigation.

The Afghán tribes, like all Muhammadans, have a great respect for the last resting-places of their own dead, at least; but the Suwátís seem to feel little compunction or respect on this head. I have already mentioned that the strip of land lying between the villages and the rise of the mountains, is set apart for the cultivation of wheat and barley, and that, in that land also, their burying grounds are situated. After a few years they allow these fields to lie fallow for some time and plough up all the burying grounds, and, in future, bury the dead in the fallow land! This may be consequent on the small quantity of land available for purposes of agriculture; but still, it appears a very horrible custom.

On such occasions as I have referred to, they get as many ploughs together as the village contains; and preparatory to the commencement of operations, it is customary to cry out to the dead: "Look to yourselves! tuck up your legs: the plough is coming!" after which they set to work and plough up the whole. They, however, appear to have some respect for persons who may have been of any repute among them, and do not disturb their graves; neither do they disturb the graves of those who may have been slain whilst fighting against the Káfirs or infidels; for such are held in the light of martyrs.

There appears to me to be no particular reason why the graveyards should be disturbed, in this manner, save on account of the paucity of land for such a large population, and the avarice of the Suwátí Afgháns; for they have more grain than they can consume, since they export large quantities. Another reason may be their stupidity; and a third, that they are of so many different clans, and do not respect the dead of others as much as their own. When the lands are re-distributed, and a clan removes to another place, the new-comers do not consider the dead as theirs, and hence show no compunction about disturbing them. With my own eyes I saw ploughs which were just passing over a grave. I asked those who were guiding them: "Why do you thus disturb the dead in this manner." I received this reply: "That they may go to Makka the blessed." What can be expected after this?

The patches of land about the lower ranges of hills, or spurs from the higher ranges, if fit, they also bring under cultivation; and where they cannot bring their bullocks to work the plough, the work is done by hand. In fact, there is scarcely a square yard of tillable land neglected in the whole of Suwát; for all the valley is capable of cultivation, there are no stony places, no sandy tracts, or the like to prevent it.

When the Yúsufzí tribe had effected the conquest of the *samah*, or plain of the Yúsufzís, as it is now termed, lying along the northern bank of the Kábul river, from its junction with the united rivers of Panjkorah and Suwát, until it empties itself into the Indus near Attak,—from the Dilázák tribe, about the year H. 816, (A. D. 1413), they remained quiet for some time. At length Shaykh Malí who was, by all accounts, the chief of the tribe, and another of their great men, Malik Ahmad, having consulted together, determined to effect the conquest of Suwát, then held by a dynasty of kings, who claiming descent from Alexander of Macedon himself, had for many centuries past, ruled over the regions lying between the Kábul river and the mountains of Hindú Kush, as far east as the Indus; together with the whole northern or alpine Panjáb, as far east as the river Jhélum, the Hydaspes of the ancients. The Yúsufzís, accordingly, taking with them their wives and families, invaded Suwát by the Malakand Pass, the scene of a terrible defeat sustained by the troops of the Emperor Akbar, under his favorite, Rájá Bir-bal, at



the hands of the Yúsufzís in after years,\* and soon overran the whole of that pleasant valley, which they finally subdued, together with the surrounding districts of Buner, Bájawrr, and Panjkorah.

Shaykh Malí made a regular survey of Suwát and Buner; and portioned out the whole of the lands amongst the sons of Yúsuf and Mandarr,† according to the number of persons in each family; but leaving a portion for distribution amongst three clans who had accompanied them in their exodus from Kábul, a few years before, consisting of Kábulís, Lamghánís, and Nangrahárís, but who were not Afgháns. The portion allotted to Afgháns was termed *daftar*; and that given to Mullás, Saiyids, and the foreign confederate clans just referred to, was called *tsíra'í*, by which names these lands are still known. Shaykh Malí first divided Suwát into two nominal parts. To that portion, lying between the right bank, and the mountains towards the north and west, he gave the name of *lánwdah*,‡ in Pushto signifying moist, from enjoying a greater portion of water than the other; for where the river separates into several branches is part of this moist tract, hence the name; and to the land lying between the left bank and the mountains on the south and east, he gave the name of *wuchah* or dry. The bounds of the *lánwdah* half of the valley was fixed, by the Shaykh, from Brrangolaey, the boundary village of Lower Suwát, nearly facing Tútakán, on the opposite bank of the river, to Landdaey, the last village to the north, just opposite Pí'á, and extending in length about sixty miles. The *wuchah* portion extended from the village of Tútakán in Lower Suwát, to Pí'á, the boundary village of Upper Suwát, a distance of sixty-three miles. The width of both these divisions was from the respective banks of the river to the mountains on either side.

Suwát fell to the portion of the Akozís, a sept of the Yúsufzís,§ who

\* The account of this is contained in the AKBAR NAMA.

† The names of the common ancestors of the Yúsufzí tribe.

‡ The plural of *lúnd*, moist, damp, &c.

§ The following is taken from a Persian work written about two hundred and fifty years since, entitled KHULÁSAT-UL-ANSÁB.

Sarbaní, son of Æabd-ur-Rashíd, Baťán or Paťán, had two sons, Sharkhabún and Karshabún. Karshabún had three sons, Gond, Jamand, and Kásí. Gond had two sons, Ghurah and Shaikah; Shaikah had four sons, Tarkalání, Gagh-yání, Æumar, and Yúsuf; Æumar had an only son Mandarr by name, who married the daughter of his uncle Yúsuf, and took his name of Yúsuf also. Yúsuf son of Mandarr had five sons; 1st Eliyas, from whom sprung the Eli-yászís, who are subdivided into the following *khels* or clans: Panjpáe, Sálárzís, Mánúzi, Guidizí, and Ayesharzís. 2nd Mátí, from whom sprung the Mátízís

are again subdivided into two smaller ones. The *wúchah* was given to the Bá'í-zí division, and the *lánwdah* to the Khwádo-zí division. These two divisions again branch out into several clans or *khels*. Thus from Tútakán to Tárrnah, are the Rarrnízís, who also hold a few villages under the low hills south of the mountain range of which mount Malakand forms a portion, such as Tsaná-kott, or, as sometimes called, Sháh-kott, and Dar-gaey. Their chief town is Allah-ddandd, the residence of Sher-dil Khán, before alluded to.

From the town of Tárrnah to the village of Mán-yar, to the north, are the Solízís, who also hold the three large villages of Pala'í, Sherkhána'í, and Zor-mandda'í, mentioned at the commencement of this article, to the south of the Suwát mountains, at the entrance of the Morey Pass, together with the Báz-darah valley, containing the villages of Báz-darah-i-Bálá or higher, and Báz-darah-i-pá'in, or lower, and the hamlet of Morah. Their chief town is Tárrnah, and Mír Æalam Khán is chief of the Solí-zís.

From Mán-yár, in a northerly direction, to Chhár-bágh, are the Bábú-zís; from thence in the same direction are the Maturrí-zís, who hold some lands among the hills, and a few small villages; and thence to Khonah are the whole of the Khází-khel; and from Khonah to Pí'á, the most northerly village of Upper Suwát, are the Jánakís, or Jának-khel.

Crossing into the *lánwdah*, we find the Khwadozis located as follows. From Brrangolaey to Rámorraah are the Khadak-zís and Abá-zís, who dwell together; from Rámorraah to Ouch are the Adín-zís; from Ouch to Súe-galí are the Shamú-zís; from Súe-galí to Nún-galí are the Nikbí-khel; from thence to Landdaey are the Sebjunís

containing three *khels*; Chagharzí, Nurzí, and Dowlatzí. 3rd Isá, whence sprung the Isázís, who are subdivided into several *khels*. They live in Buner, and are called Buner-wáls. 4th Bádí, whose descendants are few, and do not constitute a peculiar *khel*. 5th AKO, whose descendants are the AKO-zís. AKO had two wives: 1st Rárrní from whom sprung the Rárrnízís. 2nd Gouhárahi who bore four sons; 1st Khadak, whence the Khadak-zís, but they are a small community; 2nd Abá from whom sprung the Abá-zís; 3rd BÁZÍD (?), whence the BÁ'Í-zís, who being a numerous tribe, contain five other *khels*, Ama-khel, Hájí-khel (Khází-khel?) Músa-khel, Bábú-zís and Maturrí-zís, but they generally go by the name of Bá'í-zís; 4th KHWÁDO, whence the KHWÁDO-zís, who being a numerous sept, comprise seven *khels*, Adín-zí, Malí-zí, Shámí-zí, Naikbí-khel, Thaibat, and Chúní-í (?). The two latter are sometimes called Thaibat-Chúnís; but these seven *khels* go by the name of KHWÁDO-zís. All these AKO-zís reside in Suwát and Panjkorah, between the Samah and Káshkár.



who hold a few small villages; and the remainder to the south are Shamízís.

The number of families or houses of the Akozí sept of the Yúsufzí tribe are thus computed, without generally enumerating the *fakírs*,\* and others not Afgháns, of whom there are considerable numbers.

#### BÁ'Í-ZÍ DIVISION.

|                    |                 |
|--------------------|-----------------|
| Rárrnízís, .....   | 6,000 families. |
| Solí-zís, .....    | 10,000 „        |
| Bábú-zís, .....    | 7,000 „         |
| Maturrí-zís, ..... | 4,000 „         |
| Khází-khel, .....  | 12,000 „        |
| Jának-khel, .....  | 6,000 „         |

#### KHWÁDO-ZÍ DIVISION.

|                                |                 |
|--------------------------------|-----------------|
| Khadak-zís, and Abá-zís, ..... | 6,000 families. |
| Adín-zís, .....                | 8,000 „         |
| Shamú-zís, .....               | 7,000 „         |
| Nikbí-khel, .....              | 12,000 „        |
| Sebjunís, .....                | 4,000 „         |
| Shamí-zís, .....               | 6,000 „         |

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Grand Total..... 88,000 families,

which at the usual computation of five persons to a family, would give to the Suwát valley the large number of 440,000 inhabitants, not including Hindús, Paránehahs, Suwátís, and others. This I think is not over the mark; for it must also be remembered that the valley is more densely populated than any district I have ever seen, in proportion to its size, either in India or the Panjáb. Indeed some of the districts to the north of Pesháwar are populated to an extent the English have little conception of.

The number of families was chiefly furnished by Mír Æalam Khán of Tárrnah. The KHÁN SÁHIB asked him questions, to which the Mír replied. There was this slight difference, however, in the mode of computing; for example: The chief said the Rárrnízís were

\* The word *fakírs* here means tradespeople, such as smiths, shoe-makers, carpenters, barbers, washermen, dyers, mullás or priests, Sayids or descendants of the Prophet, and shop-keepers whether Hindú or Musalmán, goldsmiths, weavers, Gujars or graziers, servants employed in household duties, and a very few husbandmen; for the Afgháns like the Spartans of old, monopolize the two occupations of arms and agriculture to themselves.

6,000 matchlocks. I asked what he meant thereby; and he replied, that he meant families who could send one adult male capable of bearing arms into the field, which generally is one to a family. It is a very fair mode of computation, and a generally correct one.

Out of the bounds of Lower Suwát are the Doshah-khels to the west of the river, and the Utman-khels to the east; and beyond the bounds of Upper Suwát are the Akhúnd-khels, the descendants of Akhúnd Darwezah, who are Tájiks, that is to say, are not Afgháns. These two khels, however, are, not considered as included in Suwát.

The Doshah-khels are located on the west side of the river, beyond the bounds of the Khwádo-zís, of the Khadak-zí clan. When the Doshah-khels, who formerly dwelt in the hills behind or to the north of the Khadak-zís, descended from their hills, from time to time; they, by paying money to some, practising deception with others, and, according to the Afghán custom, taking by force in other cases, succeeded in acquiring a few villages and some lands, which, had they been wholly in the plain, and not in the hills, I could have visited. The lands they thus acquired they have not built villages upon, but have set them apart for cultivation only. Three of their best villages are, Ttálá, Bágh, and Pingal.

All to the west of Tútakán and Matakani is out of Suwát and is called the country of the Utman-khel. The village of Hissár, also, is not considered to be in Suwát.

Beyond the bounds of the Bá'í-zís of the Jának-khel, in Upper Suwát, to the north-east, lies Buner, which belongs to other branches of the great tribe of Yúsufzí. On the opposite side of this part of the valley, beyond the mountains, lies the valley of the U'shírí river, belonging to the Malízí branch of the Yúsufzís, known as the tribes of Panjkorah. Beyond the mountains bounding the Kohistán or upper valley of the Suwát river, the country of the Yasín prince lies, and the Gilgittís, who, also, are not Afgháns.

It was a natural consequence in the distribution of the lands of Suwát amongst his people, by Shaykh Malí, that some would have good land whilst others would have inferior; and that sagacious chief foreseeing that disputes would arise in consequence, instituted the peculiar custom of an interchange of lands, after a certain number of years; and to which the name *khasarrní* and *wesh* was given, from the mode of drawing lots amongst this simple race of



people, by means of small straws of different lengths. To this custom all the tribe agreed; and from that time, varying from periods of ten to twenty, and even thirty years, the lands are re-distributed amongst the different *khels* or families, together with the dwellings thereon, by drawing lots for the different portions. This custom is, with a few minor exceptions, in full force at the present time.

Some fifty years since, each *tapah* district or division was drawn lots for; but at present, this is done away with, and the people of each *tapah* draw lots amongst themselves in the following manner. First the people of each village draw lots for their lands and village, which when determined, the people of each street or division of a village draw lots for their portion; and, lastly, the families of each street or division draw lots for their portions. For example: we will suppose the village of Kábul which I have been holding with my clan, falls to you, who have been holding the village of Kandahár. On the re-distribution I get Kandahár and you get Kábul. We afterwards cast lots among our own clans, and I find the house you occupied falls to my share; and the house I occupied falls to yours. On becoming aware of this, we examine the two houses, and if they are about the same size and value, we exchange on equal terms; but if one house be better than the other, one of us must pay something for the difference. If this is not agreed upon, we remove our effects from each, take away the doors, remove the grass and rafters from the roof, and leave only the bare walls standing, otherwise a feud would ensue; for such is the bull-headed pride and obstinacy of the Afghán race.

When Khán Kachú or Kajú, Rárrní-zí, became chief of the Yúsufzís, he decreed that the chief of Suwát should not be required, on a re-distribution of the lands, to vacate the town or village, in which he dwelt, on any occasion. At this time he himself dwelt at Allah-ddandd, so that town was exempted accordingly; but notwithstanding that rule, the lands were, and still are, included in the re-distribution as well as others. This was also confirmed by Hamzah Khán when he succeeded to the chieftainship.

The houses of Suwát, generally, consist of four walls built of mud mixed with sand. On the top of this a few rafters are laid, and dry grass spread over them; and over this a layer of plaster is laid of

the same materials as the walls. They rarely last more than a few years; but this is of little consequence when they have to vacate them about once every three or four. The mosques, and houses of the Hindús, are built of stone in a substantial manner; but those of the Afgháns are all alike. The residence of Mír Æalam Khán of Tárrnah, and that of the Chiefs of Allah-ddandd, were similar to the house I occupied near you, whilst at Pesháwar in 1849, but that had white-wash, and theirs had not.

Some peculiar customs are observed in Suwát, which appear to be very ancient.

In all suits and disputes, contrary to the *Sharæ* or orthodox law of Muhammad, which is observed by all tribes of Afgháns, as well as other Musalmáns, in Suwát the plaintiff, instead of the defendant, is put on his oath, as in English courts of justice.

When a person may have had anything stolen from him, he calls upon the person or persons whom he may suspect, to give him a *saæd*\* that is to say, as they understand the word, to produce a respectable person who knows him (the suspected party) and get him to swear that he (the defendant) has not stolen the property in question. If the suspected party can produce a *saæd* who swears to the above effect, he is considered innocent; but if a *saæd*, so produced, will not take the required oath in favour of the suspected thief, he is considered guilty, and has to make good the property stolen. These two customs have been handed down from the time of Shaykh Malí.

Another curious custom, and a very good one for such a primitive state of society, is, that when two Kháns or Maliks chance to fall out, or have any dispute, the people expel both parties from the place. The two disputants are then termed *shárríní* or, the Driven Out, or Expelled, from the Pushto verb *sharral*, to drive away, &c.; and in this state they are compelled to seek shelter in other villages, and are obliged to live on the charity of those who will take them in; for they lose all civil rights on such occasions, and have no claim to wife, or children, dwelling, cattle, horses, or anything whatsoever. Some continue in this helpless state until they can come to an accommodation or reconciliation, which, often, does not take place for years. In Upper Suwát they are even more severe than this;

\* Arabic for, felicity. [Compare the compurgation of the Anglosaxons.—EDS.]



for there they expel the families also, and confiscate the property of the disputants altogether. One would imagine such stringent rules would tend to keep the peace, if any thing would; yet these people seem to be always at feud, notwithstanding.

Whenever two Maliks or headmen of a village quarrel, the strongest, or the victorious one, if they come to blows, drives the other out of the village. After some time, the fugitive manages, by bribes and other means, to gain over to his side some of the friends and supporters of the successful party, and all the discontented flock to him. After a time he finds an opportunity, when his own party is strong and the other is weak, to enter the village and drive his rival out. This is enacted over and over again, now one is a fugitive, now another; and this it is that causes such contentions in these parts. The disturbance I previously referred to as having taken place in Lower Suwát, after I left the valley, extended as far up as Chhár-bágh. The whole of the Rárrní-zís girded up their loins to destroy Tárrnah; and from Chhár-bágh to Lower Suwát, all were ready for this purpose, and two battles were fought, one to the north of Tárrnah, and another further south. The Tárrnah people, however, were victorious, having obtained assistance from their clansmen of Buner.

When fighting amongst each other, the Afgháns of these parts never interfere with, or injure the *fakírs* or helots of each other; nor do they injure their women, or children, or their guests, or strangers within their gates; and such might serve as an example to nations laying claim to a high state of civilization.

The people of Suwát are said sometimes to observe the same custom, as practised by the Afrídí tribe of Afgháns, viz., that of selling, or rather bartering their wives, sometimes for money, and sometimes for cattle or other property they may require or desire. But having witnessed the complete system of petticoat Government under which the Afgháns of Suwát, like the English, are content to dwell, I cannot place much faith in their having the courage to do so. The women in this valley enjoy more liberty, and rule the men to a far greater degree than is known amongst other Afgháns, who are so very particular in this respect. I will mention one instance as an example. The Kháns or Chiefs of Tárrnah, who are the highest in rank and power in the valley, permit the females of their

families, in parties of fifteen or twenty at a time, consisting of young girls, young married, middle-aged, and old women, to come down to Mardán in the *Samah*, some thirty or forty miles distant from home, without a single male accompanying them, on pleasure or visiting excursions. They stay at the house of the head man of the village; and return home after the third or fourth day. At the very time I was proceeding into Suwát with the KHÁN SÁHIB, we fell in with one of these pleasure parties of that very family, some twenty in number. They staid the first night at Kasamacy, and the next at Jamál Garraey, at the residence of Muhammad Afzal Khán, Khattak, the chief of that place, and the next day started for the place they were going to remain at for a few days. Although there is no fear of evil consequences arising from these excursions; yet the Afgháns, generally, never, for a moment, allow their females to go out of their sight, for three or four days at a time, without a single male relation to take care of them. It therefore seems almost impossible, that men, who are so much subject to, and so obedient to their wives, would venture to sell them, or even dare to make the attempt.

The Afgháns of Suwát, like others of their countrymen, are very hospitable. When strangers enter a village, and it be the residence of a Khán or Chief, he entertains the whole party; but if there be no great man resident in the place, each stranger of the party is taken by some villager to his house, and is entertained as his guest.

As respects the physical constitution of the people of Suwát, I should say that the men, for Afgháns, are weakly, thin, and apparently feeble, whilst the women on the other hand are strong, stout, and buxom. I know of no aboriginal people of Suwát still existing in the valley under the simple name of Suwátís. The Afgháns of this part are dark in colour, short in stature, or rather of middle size, generally thin, and if stout, they have, usually, large puffy stomachs and buttocks like fat Hindús.

The Gújars are graziers, and are to be found in the Pesháwar valley as well as in Suwát and other hill districts of this part of Afghánistán. They speak Panjábí amongst themselves; and they, probably, are the remains of the aboriginal people of these districts, who were conquered by the Afgháns when they first made their



appearance east of the Khaibar in the fifteenth century of the Christian Era, and not before the time of Alexander of Macedon, as the oracle of the "News of the Churches," and his compeers are foolish enough to attempt to make people believe, contrary to historical proof.

The females of Suwát are not veiled. When they meet a man advancing along a road, they look down modestly and pass on; but the younger women turn their backs generally, and come to a stand still, until the man has passed by. They are, however, very plain, but still look like Afgháns; but the men bear little resemblance to that fine and handsome race in form and feature; for they are dark in complexion, and emaciated in appearance. During our journey this was frequently remarked; for they appeared more like the Gújars of the *Samah* or Plain, below the mountains. If Durkhána'í was at all like the present race of Suwátí maidens, we must suppose Adam Khán to have been crazy to have fallen in love with her. I was told, however, by travellers, who had resided in the valley for some time, that, now and then, some very beautiful countenances may be seen; but I place little faith on what they say; for, when I have inquired what they consider beautiful, I never found their ideas come up to my standard of good looks.

In the morning, the Suwátís breakfast on a dish called *aogrrah* in Pushto, which is made by boiling rice to a dry state, and then mixing buttermilk with it until it assumes the consistence of porridge. It is eaten with a spoon. In the middle of the day, they make their dinner off unleavened bread, and greens sprinkled with a little salt; but use no clarified butter. In the evening they again take *aogrrah* for supper. Clarified or other butter and meat they do not eat, unless a guest or a stranger should drop in, and then not a mouthful scarcely; for they only kill a fowl for six persons! If such be the criterion in the house of a Chief, as we found, nothing but *aogrrah*, dry bread, and greens, without butter, can be expected at the board of the humbler villagers. This may account for their weakly looking appearance.

The lower ranges of hills, on both sides of the valley, are destitute of trees, but are covered with grass; and viewing them from the central parts, one would fancy they were covered with velvet, they appear so beautiful. The next, or highest ranges on either side are

covered with forests, which may be seen from the lower part of the valley every here and there, overtopping the lower hills. These forests chiefly consist of the *jalghozah* or pine, and the *zaitún* or wild olive. The *chinár* or plane flourishes also. The trees are, generally, of large growth, and bear marks of great antiquity. In fact there are planes on the banks of the main river and its tributaries, about the mosques, in the fields, and in the villages, indeed, in all directions, save the lower part of the valley where they are few. The husbandman's home, from morning until night, when working in the fields, is the plane tree, under which, in the cool shade, he rests himself, and where his family bring him his food. The other trees I noticed are the willow, the *bakáyarrn* (*melia sempervirens*), and the *palma christi*. The great subject of regret there is, that Suwát has no flowers.\*

I have mentioned the names of nearly all the different trees ; but in a country where the grave-yards are not allowed to remain undisturbed, it is not likely that there would be much in the shape of thickets, brakes, or weeds or brambles left.

The principal fruits consist of grapes, green, and not very sweet ; figs, dark in colour and small in size ; apples, of large size and fine flavour and colour ; the *tángú*, a fruit in shape like an apple, but in flavour like a pear ; the *mamúsa'i*, a species of pear, a winter fruit ; the *amlúk* (a species of *Diospyros*) also a winter fruit, but not produced in any quantity ; the *ddanbarah*, another winter fruit ; the *jalghozah* or *chalghozah* or pine nut, in immense quantities ; the *sanjit*, or *makh-rúrrna'i* (in Pushto signifying, shining-face, honest,) a species of *Eleagnis*, but growing generally near burying-grounds along with the wild olive ; peaches in great quantities ; mulberries ; and pomegranates.

The people of the more open parts of the valley are not well off for fuel, hence the dry dung of cows is used instead ; but where the hills are near, and in their small lateral valleys, fuel is plentiful enough. The pine is chiefly used for this purpose ; and pine-slip torches are generally used in place of lamps or candles ; but shop-keepers, and students, who have to read at night, burn oil. I was rather surprised

\* Khushhál Khán in his poem on Suwát says different : a part of it will be found at the end of this article.



to see a primitive description of lantern in Suwát, something on the plan of English ones, although, of course, not copied from them. It consists of a wooden frame covered with buffalo bladder, or the skin of the *pardah* or membraneous covering of the stomach of animals, stretched over it whilst damp, with a place for oil in the centre. By the light of these one can see to read very well; and during my journey in Suwát I had often to read books by their light.

There are no camels to be found in Suwát; but there are horses, mules, asses, bullocks, oxen, cows, and buffaloes. Oxen, mules, and asses are the beasts of burden. There are also dogs, cats, rats, and mice, as in most countries, pigeons, and fowls, which latter are bred in great numbers. There are no sheep of the *dumbah* or fat-tail species, only the common description of that animal; but there are goats of superior kind. The rivers also contain fish, which, however, do not appear to be used for food.

The feathered game consists of water-fowl in great numbers, partridges, both grey and black, and quail. There is no waste land to shelter game in Lower Suwát, except in the hills on either side, where animals of the chase abound; but in Upper Suwát, and in the Kohistán further north, the case is different.

The only wild animals, in Lower Suwát, are jackals and foxes, which are not numerous.

The chief reptiles and insects are snakes, scorpions, sand-flies, *brorrahs*, *mangurru*, or bugs, musquitos, and fleas, from which Heaven defend us! they are more numerous than the flies of Pesháwar. The *brorrah* is a species of worm or insect,—a sort of wood-louse—something in the shape of a bug but larger, generally infesting mosques and houses where there are old mats lying about. After biting a person, the bitten place becomes red and inflamed. The *khamanduk* of Kábul and Kálát-i-Balúch is a different insect. I slept outside a village, in the plain, on one occasion; but it was all the same: the ground was grassy, and I could not sleep for the fleas.

The principal articles imported into Suwát are, salt, which the Khattaks bring there, from the Salt Range, for sale; and a few articles of British manufacture, consisting of cotton goods generally, such as calicos, twills, and muslins; together with little coarse blue

cotton cloth, the manufacture of Pesháwar; and copper and brass cooking utensils, but only in very small quantities; for the people are so constantly at feud with each other, that they have often to abandon house and property at a moment's warning, and therefore, to prevent the loss of such expensive articles, they generally content themselves with earthen vessels.

The exports are more considerable; and consist of rice; *rogħan* or clarified butter; *úrūd* (phaseolos mungo); wheat; barley, in great quantities to all the districts round about; honey, and wax; scarfs woven from the wool or fur called *pashm*, varying in price from one to six rupees each, the manufacture of Upper Suwát, often the work of Kashmírís who have settled permanently in the country; but these articles are not to be compared with those brought from Káshkár. The *shálaka'í* of Káshkár is that worn by the Hindús of Kandahár as their peculiar distinguishing mark; but at Pesháwar, Musalmáns and Hindús wear them, without distinction. Bullock and buffalo hides are also exported, but chiefly to Bájawrr. Buffaloes are few in the latter district; and although numerous in Suwát, they are not so much so as to enable the Suwátís to send them for sale to Pesháwar. There is no trade in wool, as sheep are few, as well as goats; and the *pashm* or wool, such as they have, is required for home consumption.

The following lines are taken from a long poem in the Pushto language, which I have referred to previously, by the renowned chief of the Khattaks, Khushhál Khán, who wrote from personal observation. It will be seen that Suwát has not much altered since his day. The translation is literal.

“In the Emperor Sháh Jahán's days, I was in my youth;  
And every thing to delight the heart was easy to obtain.  
Saráe\* from Suwát is distant about thirty coss,  
By the time thou descendest as far as the river and hills thereof.  
For three things Suwát was in my memory impressed,  
In respect to which, all others were as air unto me.  
One, indeed, was this, that I had matrimonial matters in hand;  
The other was its narcissus gardens; the third its field-sports.  
I was in the Emperor's employ; the Yúsufzís were unto him  
averse;

\* Saráe is the chief town of the Khattaks.



Hence it was a matter of difficulty, my going into Suwát.  
 Malú Khán had arranged the bridal affairs according to my wishes ;  
 And in his house, the mother of Sadr\* I was married unto.  
 But whether 'twas to see its narcissuses or enjoy its sports,  
 We look back, in old age, the Almighty's favours upon.  
 The whole of it from beginning to end I brought under my feet :  
 I became acquainted with Suwát's every nook and corner.  
 Suwát is intended to give sovereigns gladness and joy ;  
 But now, in the time of the Yúsufzís, 't is a desolate hostel.  
 On the north it is bounded by the Bilaúristán mountains ;†  
 To the east lies Kashmír : to the west Kábul and Badakhshán.  
 Towards Hindústán it has black mountains, and frowning Passes ;  
 In the ascent of which, armies will get entangled, and confusions  
 ensue.

Its climate, in summer, is far superior to that of Kábul :  
 The climate of Kábul is bleak ; but that is genial and mild.  
 Indeed, it resembles Kashmír in air and in verdure ;  
 But alas ! Kashmír is extended, and Suwát is confined.  
 The valley, in length, is just thirty coss, at the utmost :  
 Its breadth is about one or two, sometimes more or less.  
 Its river flows in a direction from east to west ;  
 As to its straightness or crookedness, say naught to the scribe.‡  
 Through every village and house thereof a rivulet runs :  
 They consume the grain produced, and they export it also.  
 It has no road thro' ; no other occupation ; no other profit :  
 In truth, 'tis a granary wholly detached from the world.  
 At times the cheapness there is so excessive, 'tis said,  
 That for two farthings twenty guests can be entertained !  
 It hath cool water from springs, and from snow also :  
 In Suwát there is neither *simúm*§ wind, nor is there dust.  
 Every place throughout Suwát, is befitting a prince ;  
 But without either chief or ruler, 'tis a mere bullock's pen.  
 Kings have, in it, found both pleasure and delight ;  
 But the present people are not gifted in such like arts.

\* The poet's eldest son, also a poet.

† The country of Crýstal, from the Persian word بلور so called from contain-  
 ing mines of transparent quartz, or rock-crystal.

‡ Referring to the straight and crooked letters in the Arabic alphabet.

§ Hot wind.

There are large and lofty eupolas, and idol temples also :  
 Large forts there are, and mansions of times gone by.  
 It is a garden of fruits, and a parterre of flowers ;  
 And fit for a king, in the sweet summer time.  
 In Suwát there are two things more choice than the rest—  
 These are, rosy-cheeked maidens, and falcons of noble breed.  
 Wherever, in Suwát, there is a dwelling in repair,  
 In every room thereof, rosy-faced damsels will be found.  
 Altho' the whole country is suitable for gardens,  
 The Yúsufzís have made it like unto a desert wild.  
 In every house of it there are cascades and fountains ;  
 There are fine towns ; fine dwellings, and fine markets too.  
 Such a country—with such a climate—and such streams,  
 It hath no homes, no gardens, nothing fragrant or fresh.  
 They gamble away the country yearly, drawing lots :\*  
 Without an invading army they ravage themselves.  
 The Yúsufzis keep their houses dirty, and untidy too :  
 Their dwellings are polluted, filthy, full of bad smells.  
 If there may be *panjars*,† fleas, and mosquitoes in Suwát ;  
 Who shall give an account of the *brorrahs*‡ and bugs ?  
 I got fever twice from the effects of these *brorrahs*.  
 I was covered with pimples from the rash caused by their bites.  
 In every house there are as many dogs as human beings ;  
 And in their court-yards, fowls in hundreds strut about.  
 Every place inside is blocked up with jars for grain :  
 In grossness of living, Suwátís are worse than Hindús.  
 The Bá'í-zís subsist in a manner worthy of them ;  
 And the Khwádo-zís are chandlers and naught besides.  
 They could take, every year, two or three hundred falcons,  
 Were their customs and their ways like that of the Káfirs unto.§  
 Although other game in Suwát is plentiful enough ;  
 There is still more of *chikor*|| in every direction.  
 There are wild fowl, from one end of the river to the other ;

\* Referring to the re-distribution of lands, already described.

† Name of an insect.

‡ A sort of wood-louse whose bite produces a rash.

§ I think there is some mistake of the copyist in these two lines.

|| The *bartavelle*, a large description of partridge.



And the rascals' matchlocks are always in uproar on them.  
There are mountain goats, wild sheep, and tiny-footed deer ;  
But the matchlock men, alas ! drive them all away.  
Since there is so much country included in Suwát.  
It is more than the appanage of a single chief.  
The boundary of Chitrál is quite close unto Suwát :  
Populated and prosperous are its hills and its dales.  
The road into Chitrál lieth through its Kohistán :\*  
A caravan can reach there in the space of five days.  
For three or four months this road is good and open ;  
But, afterwards, hath great dangers from snow and rain.  
This road however is not, by travellers, for traffic much used ;  
But trade is carried on by convoy, through the more level tracts.  
There is a road leading to Turkistán by Hindú-koh ;  
And another, that leads to Chitrál and Badakhshán.  
Another road also that leads to Butan and Káshghár ;  
And one more, that goes to Moráng, up hill and down dale.  
All these lie on the extreme bounds of Hindústán ;  
And there are other routes on the confines of Khurásán.  
The Yúsufzís in numbers are beyond all compute ;  
But they are all asses and oxen nevertheless."

On some future occasion, I propose giving a few extracts from the history of the conquest of Suwát, out of the work written by Shaykh Malí, and the book referred to at page 261.

\* The tract through which the river of Suwát flows, already described, at page 253.

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#### ERRATUM.

*Page 230, line 6 from bottom. For kolat read kotal.*

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## LITERARY INTELLIGENCE, AND CORRESPONDENCE.

*Dr. Sprenger writes from Berne to the President, in a letter dated July 28th.*

“ I am approaching the end of my investigations regarding Muhammad, and after their conclusion I will try whether my eyes, which are still very weak, will permit me to complete my translation of Maqdisy. I have seen Mr. Raverty's four works, which you probably know. They are very creditable. The Dictionary is very full and I have no doubt as complete as it is desirable. The circumstances under which it has been compiled give it all the value of a work done by a native, and we may rely upon it that every word has the signification which he assigns to it. I have examined the Persian and Arabic part with care and find them very well done. The purely Pushto part is naturally still better. His selections are so full that we may say it is the harvest of Afghan literature and not merely gleanings. I had an opportunity to examine the collection of Pushto MSS. which was made by Háfiz Rahmat Khán and is now preserved at Lucknow, and I find that Raverty knows every work of value, though he had not access to that library. The print is clear and correct which naturally enhances the value of the book. The grammar is already known to the Indian public. It is very well calculated for the use of young officers. The translation of mystical verses of the Afghans may be useful for the student of the language, as he finds the original texts in the selections. I hope you will give a very favourable review of our friend's labours in the journal.

Of great use for India may eventually be the pursuits of Professor Brockhaus. After having devoted much attention to the system of transcribing oriental languages in Roman characters, he is proceeding to publish Yusof o Zalykha romanized, and it is to be hoped that the attempt will be followed by other works. Hitherto Missionaries and men like Trevelyan, who were not so much distinguished as scholars as they were as public minded officers, have pleaded for the propriety of romanizing, whilst scholars pronounced themselves rather against it. It is a new era for oriental pursuits if a man of the standing of Professor Brockhaus engages in a system, whose



success in reference to Persian, Hindustani, Turkish, &c., is a mere question of time. Why should you not in your *Bibliotheca Indica* edit some works like the *Hadyqa* of Senáy romanized? You can find men in the Madrassa, a system having been laid down, who will transcribe the text.—This year the orientalists will meet on the 24th September at Augsburg.”

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*On the subject of Captain Raverty's work we also add the following extract of a Letter addressed to M. Garçin de Tassy, by M. Nicholas de Khanikoff, Member of the Imperial Academy of St. Petersburg.*

*Paris, February 13th, 1862.*

“When on my last travels in Central Asia, the Academy of St. Petersburg wished me to purchase Afghan Manuscripts for its Asiatic Museum; and I took with me Captain Raverty's Grammar of that language (the Dictionary and Text-book have been published since), for it was in vain to seek elsewhere for details about Pushto literature, at once so interesting and complete as his. I am much pleased to be able to say that his information on this subject was exceedingly useful to me in my search after Afghan works. At the same time, I often consulted, at Hirat, at Sabzawar, etc. etc., the Sirdars (Chiefs) and Moolahs (Priests) as to the correctness of the phrases and examples cited by the Author, in order to prove the rules of his Grammar; and I was especially desirous to take their opinions on the way in which Captain Raverty explains the arrangement and conjugations of the Pushto verbs, so difficult and complicated as they are to unravel; and I am much pleased to repeat, that their opinions were very favourable to the conscientious and intelligent work of Captain Raverty.”

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The following extracts from letters addressed at different times to the President by a gentleman who has now been for some months residing at Mandaley, give some interesting particulars of the present relations between Burmah and Western China. The brief description too which they contain of such products of the former country as have been brought to him are promising for the advantages soon, it is to be hoped, to be derived from a freer access to the interior.

Mandaley, January 7th, 1862.

About my going up the river, or any one's going up the river, to see what can be done at Bamo towards piercing China, I have done nothing. The attempt moreover to go into Yunan at present, would be suicidal. Though the account in the newspapers of a Burmese embassy being sent back from that province is unfounded, for no such embassy was ever sent, yet the whole province is still disturbed, and the fierce civil war which has so long stopped all commercial transactions is only succeeded by the suspicious calm of a *successful* insurrection on the part of the MUSSALMAN Chinese, or "Panthees," "Panjais," "Panseys," as they are variously named.

These Chinese disciples of Mahomedanism, are now dominant throughout the South-West part at least of the province, and hold the few roads into Burmah. That road which debouches at Bamo runs through the battle-ground, and the people are yet afraid to trust their persons or their property to the chances of safe transit. Some wealthy merchants who had made the attempt, arrived here about a month since stripped of every thing but their clothes. The Chinese (here) have a fortnightly dawk from Bamo, and have heard no news yet, which gives them any hope of the traffic being reopened this year.

Some of the "*Panjais*" arrived here a few days ago, but not from Bamo, they came by a route which has been equally abandoned during the civil strife, but which being more immediately in their exclusive power, has been the first to be reopened, by that from "*MOMIEN*" through "*Theinniee*." The whole distance is a tedious land transit, almost due west,—bullocks, asses, and mules bearing the dried pork, *opium*, walnuts, &c., that form the greater part of their merchandise, copper (and zinc?) too in small quantities is said to form a part of these imports. More of these are expected to come by this same route, but none of the Bamo caravans are hoped for. The Chinese are the reverse of communicative, but what they have told me in conversation, confirms other sources of information to the effect, that the Bamo route is closed either for going or coming, to Chinese as well as foreigners.

On the 1st November, I left Thyetmyo, and have heard not a word from the authorities on the Pegu side of the frontier, since my departure. Such are the facilities of communication! I have been kept in daily expectation of the arrival of dawk boat or Steamer, or



should have been on my way towards Bamo, long ere this. The chief "Inner" minister, a personal friend of the king, and having authority over the Bamo district, has told me that there would be no objection to my going to Bamo. The Maguee Minggyee, however, who is the virtual Prime minister and whose "veto" is sufficient to prevent any step being taken, has heard of the English wanting to send an expedition to Bamo and will say nothing about it, till he is furnished with the particulars of the "personnel," as well as objects of the said expedition. He is also offended by an article in the Rangoon papers, which *preceded* my arrival here.

I have to send you by the next mail an account of a trip to the Shan hills to the Eastward of this; I went up among these mountains to see some tea plantations the king wants to work, in order to know how best to recommend His Majesty to proceed. I had never seen a tea plant in my life before (!) I must tell you; but the idea gave me a very pleasant trip with every advantage of safety and comfort and a week's mountain air and exercise. Although a special guide, the Governor of the district, and about thirty men accompanied me, I had no opportunity of transporting either plants or rocks, and the spoil was therefore trifling. The king insisted on my recommending what course to pursue in order to get tea fit for European markets from these old plantations. I advised that a superintendent be obtained from Calcutta with a few natives to manufacture tea, and another to form fresh plantations. He enquired the cost and salaries, &c., and on my preparing a rough estimate, His Majesty requested me to get the men here, offering to give the money first into my hands if I wished. I have acceded to *their real* wish, however, and advance the money myself leaving a copy of the contract by which the Burmese Government on one side and the workmen on the other, will be bound, in the hands of the "Inner minister."

I write to Grindlay and Co. by this opportunity to endeavour to get these people. There is no reason against the encouragement of Burman tea growing; if they do their utmost they can grow but a few thousand pounds, and this utmost they will not do. If the tea fields do become productive, all the better for us, both *ultimately*, and in the meanwhile, that it is by English aid, the advantage is gained.

His Majesty has asked me about several other industrial enterprises. Among other things he wants to increase and encourage

cotton cultivation by every means ; he asked me to get him the estimate of a Hydraulic Press for packing cotton, a Whitney Gin for removing the seed, and the machinery for making *yarn*. I tried to persuade the king to give up the latter project, showing him that it would be a losing one, His Majesty, however, says : “ Never mind, let me lose.”

He is very anxious to get some mocha coffee seed, cinchona-tree seed, good tea seed and for distribution among the peasantry American cotton seed. He asked me the day before yesterday whether we could buy all the cotton the country would grow ! I am preparing a short summary of our cotton transactions that will surprise him even more than what I told him on that occasion. He asked what I thought of the country in comparison with those I had visited. I intimated that I did not wish to speak out on this subject, “ the discourse would be long.” My not being a master of the Burmese language, especially of the Court dialect, prevented my speaking out the truths that I hope to have yet an opportunity of suggesting to His Majesty. “ After you have been here five or six years you will understand all about the country ;” “ Whenever you think of anything that will be to my advantage, let me know ;” said the king. When I spoke of the *undeveloped* wealth in the mountains and the soil of the plains ; he agreed, and said, “ Ah ! the Burmans are very idle.” I in turn replied “ ’tis true ! ’tis true !” Usually Camaratta acts as interpreter when I see the king ; on the occasion, no one was present but one of the “ inner ministers” and myself, His Majesty seemed to be more free even than usual. Yesterday he sent for me, from his impatience to know about what I could tell him of the prospect of his getting machinery to further the cotton exportation. On my entering the inner palace, the sound of the rattan, and its victim surprised me. By and bye, I found the “ inner” minister looking on at a general flogging in the yard below, of the door-keepers who had allowed a priest to come into the inner part of the palace, without orders. This minister occupying one of the highest positions, the chief member of the interior council of four, had been scolded but a few days ago by His Majesty, and told that he was a liar, and deserved to have his mouth so struck with a shoe that all his teeth would fall out. Now, seeing the whipper lay it on mildly, he went down the steps, took the rattan himself and flogged the executioner with his own hand to show him how to do his duty !!



The king gave me the other day a pony. The Maguee Minggyee told me that he had presented two to His Majesty, and advised me to ask his colleague whom His Majesty had directed to give me the pony to give me one of them. I went through the royal stables and picked out the best of about fifty. His Majesty I presume is ignorant that the palace stables contain nothing but small seedy ponys of very inferior value. The one I chose is one of the two the Maguee Minggyee had given, the only two in fact that I should not be ashamed to ride. His Majesty has bought a house for me, and seems to count on my residing here.

If our Government pleased to appoint a Consul here, I am sure it might be done. It is a great pity that there is no respectable representative of any English house of business here. I am the only Englishman in the place, and cannot but observe that the failure in the attempt of Rangoon firms to do business here is the fault of themselves or agents. The laws are such, that a contract is not worth the paper it is written on. But the only firm in the country that can do business on any but a huckstering scale is His Majesty. His Majesty is compelled to do his business through a set of Armenians and Moguls who cheat him, and defile his reputation into the bargain. If the king were wise and used his means well, he might be one of the rich monarchs of the East, instead of the poorest. He professes that the English help could be of great service to the kingdom, and hints his fears that our Government would hinder his being supplied with this aid.

His Majesty has undoubtedly great faith in every thing English, of course faith is here quite divorced from charity—and nothing is better than that this faith should be cultivated and fed. The French have been unlucky in the figure they have cut here. The king was intensely disgusted at the set that D'Orgoni brought here, their quarrelling, and exposure of each other's rapacity, even in his presence, abusing each other in the most violent manner, have made an impression on his mind that nothing will remove. I am sorry that a Frenchman here, a *gentleman* not of the D'Orgoni set—is about to bring here a French mint. Every aid, and step by which His Majesty endeavours to civilize his country should be supplied *by us*. There is more reason for this than I can detail to you here. For the good of this people, for the advantage of our own commerce, and

for the advancement of civilization and Christianity, we should assist to raise this country, while *it has a ruler willing, nay anxious* to avail himself of every aid he can obtain to that end. The present king would rather get cotton grown, iron smelted, pottery made, and produce of all kinds exported, than get fresh muskets or cannon when he knows he can't afford to load them. The muskets he has, he lets remain rusty and uncleaned. In the scientific or natural history way I have been able to do nothing. The Maguee Minggyee promised to lend me every assistance, *i. e.*, leave to collect in getting Burman specimens, but wished me to write to Calcutta and get some foreign trees and plants for the king's garden; His Majesty too asked me to get him some shrubs and trees or seeds of them, to plant in his "botanical garden," where he purposes to collect all the plants of the world!! Some flower-scented flower seeds and flowering shrub seeds he much wishes. The Shan hills, I think might prove favorable to the quinine tree. I discovered the real *cinnamon* tree in abundance there, with bark of apparently prime quality. If any cinchona or quinine tree seeds are procurable in Calcutta may I ask the favour of a few being sent to me by post?

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*Mandaley, February 12th, 1862.*

Your kind note of December 14th I received four days ago.

In my last I said I hoped to be able to send you the account of my trip to the Shan hills, and of my being about to start immediately for Bamo. I have been so busy lately that I have not had time to write out my notes of this trip. My trip to Bamo is very indefinitely postponed. The Court of the great king, Lord of countless umbrellas, is a little disturbed with doubts of my being really a harmless "teacher officer," or a disguised powder barrel. The Golden Face is in fact dim towards me. I have not seen it for nearly a fortnight, and of course, am devoured with grief! It is very likely, however, the sun will shine again soon, especially if Colonel Phayre sends a pleasant message to them, or I get something to present to His Majesty's garden by the Steamer.

Further than Bamo, I would not think of attempting and am quite certain I should get no one to accompany me.



These Mussalman Chinese are inclined to be aggressive towards Burmah. I have private information of a message they sent to this Court, requesting to be allowed to come to trade by the Bamo road. Their request was accompanied with a threat. Their adopted faith has very likely infused into them a fighting spirit. They are masters of western Yunan, it is certain; and hold all the doors of communication between China and Burmah.

I am delighted to find Colonel Sarel's account of his trip up the Yang-Tse Kiang in the No. of the Society's Journal just received. Yunan then *imports cotton* from both sides, and exports minerals. Its trade with Burmah if re-opened will be in the hands of the Panjais or Mussalman Chinese, not as of old in the hands of the orthodox Chinese. As far as I know, the Government here sent a pacifying reply to the Panjais from Yunan, and ordered the official at Bamo to allow them to come, but without arms, and to watch with vigilance their numbers, and doings.

I dream of the removal of the capital (query whether as a capital) back to Ava, of a beautiful pleasant suburb at Sagain with a steam ferry between: Ava to be the depôt of the China trade *viâ Theinne*; having ready communication, with Tonghoo; and a half way station or depôt, for the *Bamo China trade* which used to bring into the king's coffers five lakhs a year! Now of course not a rupee is collected at Bamo from the China trade.

You cannot imagine how difficult it is, to get information and yet avoid exciting suspicion here. I hope to get, however, correct and full particulars of the present and past state of the Bamo and China route; if I fail in getting up there myself.

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You are no doubt well aware of what is going on in Cochin China, and read the signs of General Bonard's ("the French Mouravieff,") doings. The Cambodia, as far as I can learn here, and I trust my information, is navigable for large boats up to *Kiang Tsen*, latitude 20° 50' from thence to just below *Kiang Hung Gyee* in latitude 22°, it is obstructed by rocks and rapids, over which small boats only *can be dragged*. Above this again, the river is open and clear.

Kiang Hunggyee is in Burman territory. Kiang Tsen, as far as I have ascertained, is Siamese. That is, the Shan inhabitants are tributary to Ava and Bangkok respectively. So you see how near our

Gallic friends are. I think it highly important that the Shan States be made interested in the British policy before they are permitted to be played on by French influence.

In the midst of this excitement here, I await with confidence the opening up of the country. The Woongyee has indeed appeared to be convinced that my going over the country can do nothing but good, and has even hinted a day or two since, that he will do his best to get the sanction of the king to my examining whatever mountains I wish to visit, and looking at what I want with all the assistance they can give me. This Iron has had an effect on them. The king has been told of it, more than once, and discussions have taken place how to best reap the benefit of what I have shown to them. I shall hint that they might reward me by giving me the opportunity to throw open to them other sources of wealth. The Woongyee has hinted that I might perhaps go over mountains, &c., with this view.

I give you a short account of my visit to the Iron Stone mountain. On Sunday evening, 29th June, I sent to the Prince, to say that I thought rain would fall heavily after a few days, and would like to go to the Iron mountain "to-morrow" or next day. The reply was an elephant at my disposal at 9 o'clock that evening and ten musketeers would be ready to accompany me in the morning, when before starting His royal Highness wished to see me.

On Monday morning then, the Prince ordered the men in command of the militia to take care no dacoits or thieves came near me, and requested me to take care of fever and particularly not to stay many nights at the dangerous place.

Turning the Mandaley ("Mandivè" in Yule's Map) hill on the west and north sides, we skirted the immense artificial reservoir of the "Mandagan," cutting through the south-east part in a north easterly course, till we neared the little villages that lie between it and the foot of the precipitate Shan mountains, like oases in a green desert, for the plain was all green paddy, and the village sites were clumps of bamboo, palm, mangoe and tamarind trees with little gardens and patches of Plantain trees. After about (5) miles, we came upon ground evidently formerly cultivated for paddy, but now left to the white dhatura, the euphorbias, and scanty herbage, for want of rain. My Mahout, a native of this district, said for the last



five years the want of rain had prevented cultivation. "Why don't you grow foreign cotton?" Where can we get the seed? The Burman cotton won't grow here, and is bad. The "Thimbau" (literally *ship*) cotton would answer very well, if we could get it. "Well, supposing now I were to give you and all the people here the seed, would you cultivate it, and sell me the produce by contract at a certain rate agreed on?" "Oh yes, and gladly." "We are all in great distress now, and do not know what to do." "What taxes have you to pay?" "None, we only give a *quarter* of the produce for the land." "And your service, what wage do you get for that?" I knew before,— "What wage, what do you mean?" I am an 'amoodan.' An amoodan is an hereditary servant of the throne. All the soldiers are amoodans, there are amoodans of all kinds. Soldier amoodan, 40,000, boat amoodan 10,000 (?) mahout amoodan 3,000 (?) horse amoodan 3,000. (The General commanding the Cavalry, told me 25,000!) artillery amoodan 1,000, blacksmith amoodan, tailor amoodan 300, &c., amoodan of all occupations in fact, who are the hereditary slaves of the crown. All amoodan children are amoodans, and a free-man marrying an amoodan's daughter enlists himself thereby. There are amoodans who do nothing but cultivate the royal land, unless called to some special work; and on special occasions all the population become amoodan, *i. e.* render free labour and service to the king's order, for instance the great canal which as yet has failed.

They live then on the three quarters of the produce of the land lent them by His Majesty. This amoodan system has opened up several questions to me that will probably be of practical interest to us at some future day.

Well, continuing north-east by north we passed over a large expanse of good soil, with but here and there a little cotton (Burman) a little Indian corn, a little patch of unhealthy paddy. It seemed to me good, arable land, rich but a little too dry for paddy. The Mahout's accounts confirmed this.

About 1 o'clock P. M. I noticed some bluish limestone cropping up with a surface altered into chalkiness. This was in situ, of a fine quality. Would pay immensely if burnt, for lime is of enormous price at the capital. No more stone, till we came to "Bouk," a village at the foot of a high part of the range of mountains, about 3

o'clock. The rest of the afternoon I spent in shooting myself a dinner of *one quail*, and two plover for my guide, an Armenian sent by the Prince. The ground gravelly, formed of debris from the mountain supporting a shrubbery of *Acacias*, *Zizyphus*, *Euphorbias*, Cutch trees, &c. &c., and a pretty good herbage; besides the gravelly debris, there being a good alluvial of rich red soil.

The evening spent in getting information from my host the headman of the village and district.

The morrow we started due east to the instep of the hills, and soon came upon a kind of schist, ringing at the hammer, dipping as far as I could see about sixty-five to the east and with its striæ shown by the weather-worn surface and by fracture running north and south, huge masses were scattered over the surfaces, but much was evidently in situ. Among it I came upon a mass of conglomerate, which seemed to curve up from between the schist, and which consisted of pebbles of quartz and large lumps, some a foot in diameter, others an inch or less, of the magnetic oxide of iron, cemented together by siliceous (?) matter into a hard mass. This I had plied with some crowbars, it seemed to go deep and extended along to the foot of another little hill. Going on, I found lots of the oxide imbedded in the soil lying on it, and sometimes firmly bound by the schistose rock. I ascended a small hill, formed as of huge masses of the schist, piled one on other, and after asking some more questions, determined, much to the discomfiture of the military guard, to go on forthwith to Seebeing, a village the other side of the immense mountain before us, and which journey I had intended to make the next day. Mounting my pony, followed by the village headman also mounted, I set out, then at about 9 o'clock. Our path lay first north-east and east, winding up between the hills, till we had evidently pierced the range, then turning *south*, we had the high ridge on our right and west, another high ridge on our left. Our path lying along a valley stretching between the two ridges. The summits were serrated, clothed and fringed with trees, except where evident landslips had left great bare perpendicular patches of red earthy-looking rock. The stones, and bared rock of the same schistose character, apparently a schistose limestone. Generally black by exposure and of most irregular weathering, sometimes, however, the rock, though evidently of the same nature, was whiter internally and weathered a clean cream colour with a smooth surface.



The valley narrowing, we slowly ascended still, till at 3 P. M. we arrived at the village of "*Seebeing*," where the inmates of six houses live by making charcoal on the sides of the hills on either side of them, and so close that it looked as if one could throw a stone to either. I hurried on to the spot where the village people said the "iron stone" was to be found.

After a mile or so, we ascended some of the toes as it were of the mountain on our right or west side, and at one spot, I could see far away, the valley stretching to the south and widening into low land. Getting close to the main ridge, they conducted me to a hole, about six feet square and ten feet deep. "Who made this?" "We dug it, because when this 'iron stone' was shown to the king, His Majesty said, there must be *silver* ore, beneath where this was found, and ordered us to dig. We did so, but could find no silver ore." I went down the hole by a bamboo, and found the same rock that I had been going over all day, but a more slaty-like structure and of a more crystalline grain, with none of the veins of quartz that made some of the rocks bear the name of a silicious schistose. The dip was east  $65^{\circ}$  and the cleavage so to say north and south. Besides this was on the south and west side of the whole huge blocks of iron oxide, (magnetic) and as deep as could be examined, the same iron ore with little pebbles of quartz, and clayey matter extended.

Coming up I examined around, to the east, west and south I could see nothing but the crystalline, cleavable, rock, rising in great masses, and tumbled pell-mell down the mountain sides. To the north, however, I tracked up a line of iron ore cropping out from among the common rock, in sometimes huge blocks of several tons' weight. One piece I saw, like a great square casting, with little veins of quartz running through it, and a flat table surface six feet by ten feet, while its thickness was not less than five feet. Other enormous blocks seemed only barely uncovered, and I must have seen and handled hundreds of tons within the few yards I could examine. The little hill on the side of which these blocks were cropping out, was crowned by several knife-like peaks of the common crystalline rock, looking like awful sentinels, and of a drab-grey colour, not black.

Turning back to the village, I found my escort, guide, he had just arrived, my boy being at Bouk with all provision, clothing, &c. &c.

What was to be done to appease the stomach that could not digest ironstone, or slaty limestone? I bought, after some trouble, for the poor people had no provision to spare, some rice for the escort who had also left all at Bouk, and permission to shoot a fowl, I shot the fattest hen I could see, and my syce having boiled it, finger and thumb did duty for carvers, and while discussing the "Sigbing well," a probable exhalation of carbonic acid gas, in the neighbourhood, and the morrow's route, I fell asleep.

On waking the next morning I got all to set out for Bouk at once, and again with my companion of yesterday, the Bouk headman, started north along the valley. After following the same road for some six miles, we struck off against the ridge on our left as it were, but managed somehow to come into a glen and then up and down, through a pass across the apparently single but now clearly compound ridge of mountains, and finally descending on the western side, came into the road of yesterday again, and after getting a view of Mandaley in the distance, reached the plain and galloped into Bouk.

Here some blind people who had heard of my relieving some people at the capital came to get sight. They were incurable, but showed me that my healing fame was spreading.

Returning the same afternoon we went first south-west for a little, then westerly to gain the north-west corner of the great Nandangan reservoir. In the plain about four miles from the mountain foot spurs, we came upon a hill of mainly the same crystalline limestone with the same dip and strike that I had seen near *Seebeing*, but with also abundance of quartz and felspar. (?)

A quiet ride along the flat plain, through a few villages, and about 7 P. M., the tired elephant landed me at my door.

These hills evidently consist of transition rocks of Primitive Limestone, gneiss, siliceous schist, slaty and crystalline limestone,—mica is more or less abundant everywhere. The small hills that I have had an opportunity of examining between the Irrawaddi and the Shan mountains, and south of the Sagain limestone, are *gneiss*, *granite* as at Kangee of a red and grey mottle, with no tendency to stratification, crystalline and slaty limestone, and siliceous schist, and pure quartz as at Kyatping about thirty miles to the north-east of this.



While at Bouk, I obtained information of some iron stone similar to that at Seebeing being found on the east side of the same mountain whose west foot shows the oxide at Seebeing. From Seebeing to that spot is four miles, from it to the foot of the mountains two miles, from the foot of the mountain, carts can come to a ferry on the Ongbringlè, and all difficulty ceases. From Seebeing itself the villagers can come to Mandaley and return half way the same day, by a rugged pathway through a pass in the mountains. If the ore be, as I see no reason to doubt, in immense quantity, the reduction of it on the spot where wood and charecoal are to hand *ad libitum*, or the transit of the ore to the river, would be both feasible and immensely profitable. I assayed the ore and obtained 68 per cent. of pure iron. I smelted some with limestone, and made it into steel, by the *Wootz* process.

It was pronounced by the French meehanie in charge of the Princee's foundry equal to the best steel purchased from Calcutta, as English steel, and made into ehisel, &c., that cut the said English steel. The meehanic told the Princee, that if he could get this steel, he should require no more foreign steel for the purposes of the workshop. The price of the "English steel" mentioned is seventy-six rupees a hundred viss.

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*Mandaley, May 2nd, 1862.*

If you know from other accounts the real state of Yunan, you will not be surprised that I am still in Mandaley. Nothing could be done, beyond getting one's throat cut in vain, in the Chinese territories bordering on Burmah. The rebellion is over, the suspicious calm I spoke of in my last to you, has broken up into general lawlessness, rapine, and anarchy. Village plunders village, every man's hand is against his neighbours. Famine and distress have swelled the numbers of robbers and pillagers. If a Chinaman comes through the passes it is in flying from his enemies without goods or property and often leaving his children or his wife in the hands of the successful insurrectionists.

The Kakoos or Kakhyens have been drawn into the strife, or rather the universal scrimmage. They are plundered and forced to join their plunderers in the next expedition of rapine.

Again I think it would have been useless to attempt the journey

because the present state of things here must change. The country cannot exist much longer under the present policy. That policy is so much disapproved of by some of the chief men of the country that it must change.

P. S. The most reliable accounts I can get about the cotton produce, are that the average produce *was five million* viss a year. This dropped on the commencement of the Yunan troubles six years ago, and consequent ceasing of the cotton exportation to China, and cultivators gave up cultivating cotton, because there was no market for it. Within the last two years only has it been cultivated with a view to exportation down the river. The whole produce last year was estimated positively as the most correct amount by the Yo Atween Woon (I can get no more reliable authority) at one million and a half.

Got another ore to-day from a hill twelve miles distant sent me by the prince, a magnetic oxide in quartz, said to be *plentiful*.

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*Mandaley, June 11th, 1862.*

I have learnt within the last few days something of the reason how it was I could not get up the river. The Bamo At. Woon who showed himself to *me* most willing to assist me, told the king about my wishes to go to Bamo, and about the proposed expedition, mentioning the desire of the English to open up the commerce with China by that route and to have Merchants' Agents at Bamo. His Majesty did not see any reason against these measures, but the Bamo At. Woon himself did, and advised the king that I should not go, and that if English Merchants get up there, complications and difficulties would arise, that would become serious. Another Atween Woon, the frequent listener to little discourses of mine, was of opinion that the revenue and advantages to be derived from English mercantile transactions through Bamo would be a great good, and that if the English wished to try, they should be encouraged.

This Atween Woon it was who more recently told me he would manage to get me to go to the gold districts of Mogoung. He was sincere ; but I suspect, from his telling me a few days ago *what is really the fact*, that in this season, it would be impossible for me to reach the spots from the overflowed state of the country, that higher authority than his does not see that it would be prudent to allow me to go.



As to the China side of Bamo, my former letters to you will have shown you that nothing is to be expected from there either commercially, or as welcome for a scientific expedition for a long time to come. Yunan is in short yet in anarchy.

The Chinese, themselves in constant communication with Bamo, inform me that no commerce of any kind is to be hoped for a long time. The country is still in the hands of the Moslem Chinese who, like their brethren all over the world, have imbibed with their faith a love of the sword and its work. They are but a handful among their countrymen but play sad havoc with its tranquillity.

I am just at present in great popularity here. The great people profess for me the most cordial feelings and the heir-apparent, the renowned "War Prince" after the many times he has expressed himself so graciously towards me, sent for me the other day to spend the *day* in conversation with him. His royal Highness reiterated his request for me to teach one of his Secretaries chemistry, saying the king had promised him the post of Atween Woon (Minister of the Lower Council of four) as soon as he had acquired the science. We got on the subject of stones and a little museum grew up before me, containing several mineral ores, that the Prince said he had obtained by sending his men over the country to seek for them.

These ores he sent to me for analysis and now while I write several of his people are in my garden working a forge and bellows, reducing some iron ore under my directions in order to my analysing it. It is a rich magnetic iron ore, similar to that which produces the best Swedish iron and *steel*. It was brought in about a year ago, but its virtues have hitherto been disbelieved in, and it has never been reduced. There are immense quantities of it two days from this.

Another I have found to be almost pure BISMUTH. The ore having a specific gravity of 8.1

A third was an iron pyrites also abundant, but of no use except for sulphur and sulphuric acid, both of which, the prince assured me, they make from it.

The bismuth ore I do not yet know from where it comes or whether it is in plenty: I am afraid not. If it is, this ore, the steel producing magnetic iron, and cinnamon, and tea that will be produced from Burmah, will amply reward me for my series of annoyances and vexations suffered here. There ought to be found some *tin* ore

somewhere in this range ; gold, I look on as only waiting for an opportunity to be worked up into a new little "El dorado." The rapacity of the local and distant officials took so much of the profit away from the native diggers that it has long ceased to become lucrative, but the geological formation of the rocks, the abundance of gneiss, quartz and mica hills, the almost universal presence of gold in the river sands proclaim that new "diggings" will be opened somewhere in this range of mountains, which after all are but the parts of the chain that in the Ural and Australia are so rich in the yellow god.

When I was before His Majesty a day or two ago, they discussed the advisability of making acquaintance of some branch of knowledge a necessary part of fitness for office. The Prince, said I had promised to teach chemistry, to the Secretary to whom His Majesty had promised the Atween Woonship, and they came to the conclusion that every high official should learn some branch of science !

We have just finished the reduction of the magnetic ore. Got fifty grains of bright pure metal from seventy-five of the ore, and I have no doubt that this is not the most to be obtained.

Your informant makes a mistake about the gin for cleaning cotton.

Nothing of the kind has been received here, cotton is cleaned with the little hand-roller and nothing else. The French workman made a whitney gin but it did not answer, neither have they Presses. In the event of a treaty being got, these will be obtained in plenty, however, by the merchants who will then come to this splendid field.

Splendid it is in every way, vegetable, animal and mineral products in unbounded quantity. I shall regret leaving it before seeing it opened to the English shovel and spade.

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The following is from Capt. L. Pelly, since last year, on the east coast of Africa.

*Zanzibar, 28th July, 1862.*

I have just received news from Captain Speke ; he was writing in September last year, in  $3^{\circ} 28'$  South, about forty days S. W. of the Victoria Lake, and about eight days W. N. W. of the Tanjanika Lake ; at a place called Babweb. He has been sick—had met with many delays owing to the disturbed state of the "Umainesi" territory. Grant had been looted. I am securing a caravan of fifty men with goods after them.



Baron Deekan leaves this for Momlass in a few days. He will return to the Jagga territory, thence turn the Kilimagari snow-peak, and push on North for Kenia; coming back again to the coast of the Masai haunts.

Some months ago I proposed a tour to this Kenia. My idea was and is, that it is the highest peak of all; and the centre of a group whose eastern streams run down to the Formosa Bay south of Sanoo, under the names of the Ozi, the Dana (probably the main stream) the Pamumla, &c. I cannot help also conjecturing that streams run N. W. from Kenia. Government properly considered that I should not leave my post at Zanzibar for any length of time; hence I could not undertake the trip in person. But I feel pretty sure that if prosecuted across Kenia and to the north point of the Victoria Lake, it would be one of the most interesting tours possible.

You say some gentlemen wish to come to Zambezi on a shooting expedition. Allow me to mention that some time ago Baron Deekan entered at Wanga, south of Wasseenpar: of latitude north point of Pemla Islands, and passed ten days in land W. and E. South to the Lake Zijse, through which passes the river Paugani debouching nearly opposite to Zanzibar. The Baron's route was good, practicable for donkeys, tribes not hostile, passed after leaving the coast, the Wadigo country, keeping the Umba river always on the right, in four days reach Baramu belonging to the Usumbarah king. Pass villages of Tassini, Tesa, Mikueni, Tesamkuba, of the Wadigos, then three days through the wilderness (game, antelopes, gazelles, pig, rhinoceros, fowl, zebras, giraffes, buffaloes, &c.) then from Baramu to Pare, two days' sport the same, then from Pare over Kiswani in two days to the Lake Zijse, the lake is some thirty miles long and two to three broad, its western point only three hours from Daffeta where you can buy supplies. This sporting-ground is magnificent: elephants, hippopotamus, rhinoceros, lion and all game down to the smallest.

There is only one day's march during which no water is procurable. A party leaving Bombay during the north-east Monsoon, by Buggalow could reach Zanzibar in eighteen or twenty days; and be on their shooting ground in a month from date of quitting India.

Mr. Cooke just now left me to put up some specimens for you.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR MAY, 1862.

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The Monthly General Meeting of the Asiatic Society was held on the 7th instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received :

1. From Captain F. W. Stubbs, a rare and undescribed coin of a King or Satrap named Sophytes.

2. From Babu Gourdass Bysack, the coin of Altumsh, exhibited at the last meeting.

3. From Babu Brojojibun Bose, an inscribed copper-plate found in his Zemindaree, Lot 55, Sunderbuns.

4. From J. G. Pughe, Esq., Monghyr, a black stone image of Buddha, with an inscription on the back containing the usual Buddhist creed.

5. From Dr. Hayes of Singhbhoom, cranium of a Lurka Cole.

6. From Mr. Cowell, a copy of the eighth Sarga of Kumára Sambhava, edited by Pundit Premchandra Tarkabágis/a, with his commentary.

7. From Dr. Tholozan, Principal Physician to His Majesty the Shah of Persia, through E. B. Eastwick, Esq., Secretary of Legation, Tehran, a copy of Persian translation of a treatise on Auscultation, Percussion and Palpation, published by him.

8. From D. Framjee, Esq., a copy of his work on the origin and authenticity of the Arian family of languages.

Mr. E. C. Bayley, read the following, containing a notice of some sculptures and inscriptions from Muttra, which the Lieuten-



ant-Governor of the N. W. Provinces has placed at the disposal of the Society :—

At the close of 1860, Mr. Best, the then Collector of Muttra, in levelling a site for the new cutcherry at that station, cleared away a portion of a large earthen mound. It soon appeared that this mound covered the ruins of a large building which had, at a very early period, been levelled, and above which had been built a Musjid of some antiquity which in its turn had been blown up for Military reasons during the mutiny. The mound, which is pretty extensive, is situated at the entrance of the station, from the main road leading from the city of Muttra to Agra.

Mr. Best had not the means at his command to complete the investigation of the ruins. Nor has any attempt been made to ascertain the ground plan of the original building, but the mound was trenched throughout, and a number of statues, cornices, bas-relievos and pillars have been discovered.

These are all more or less mutilated, and appear to be of varying antiquity. It is probable, therefore, that the building passed through stages of decay, repair and additions before its final destruction. One piece of stone indeed, which originally appears to have formed part of a sculptured drain pipe, has evidently been subsequently made to do duty as part of a stone-ladder, and the ruthless hands which fitted it for the latter purpose, have unfortunately hacked away a great portion of a very interesting inscription which it originally bore.

It is indeed on account of the numerous inscriptions which these sculptures bear that they are chiefly valuable. Their execution is not of a very high order, and the coarse material of which they are composed, the common red sand-stone of the neighbouring quarries; is not favourable to any great degree of perfection in plastic art. They are all, however, of a Buddhist character, and the inscriptions add their testimony to this effect.

Colonel Cunningham, who visited Muttra shortly after their discovery, in company with the Lieutenant-Governor; immediately recognised the value of the discovery, and at his recommendation measures were taken to preserve what was discovered. He copied the inscriptions, and on a subsequent visit to the place, I also did so somewhat more leisurely. Our copies for the most part agree pretty

accurately, but the inscriptions themselves will, I trust, soon be published in our Journal from the originals which the Lieutenant-Governor has kindly placed at the disposal of the Society, and which the East India Railway Company have liberally agreed to convey to Calcutta.

I do not therefore propose now to describe them at length, and merely say that an inscription on one of the pillars declares the building to have been a "Vihar of the great king of kings Huvishka," whose name occurs in the well known Bactro-Pali inscription found at "Wardak" in Affghanistan. Colonel Cunningham was the first to point out that there can be little danger in identifying this Huvishka with the Hushka of the Scythian kings mentioned in the Raja Tarangini, in the same manner as the "Kanishka" of the same authority and of the early traditions handed down to us from other sources, has been identified with the Kanishka of at least one Bactro-Pali inscription, that of Manikyala. The two kings are too almost beyond doubt the Kanérki and Oerki of the Indo-Scythian coins.

Several of the Muttra inscriptions, including that which mentions Huvishka, are dated in ciphers, and it is curious that apparently the same class of ciphers is used as in the Bactro-Pali inscriptions which read from right to left; throughout the inscriptions from Muttra are all in the Indo-Pali characters which read from left to right.

Unfortunately we are as yet unable either to assign any value to these ciphers, or to be sure of the era to which the dates refer. The present discoveries, however, afford data which it is to be hoped may render the solution of the enigma more easy.

Two of the inscriptions record the titles, and one also the date of another king whose name, however, is unfortunately imperfect, and which we can at present only say began with the word "Vasu," it may have been Vasu Deva, Vasu Mitra, or some other similar compound.

Some names of places are also mentioned as Udiyana, possibly the modern Hurriana.

These results, however, and I hope others, will be given at length in the Journal on the arrival of the inscriptions themselves, which I trust may be at no distant date.

I can only say that I hope some remaining portion of the mound



may, at some future date, be completely explored as well as the many similar mounds existing at Muttra, all of which probably cover, and some of which are known to cover, similar remains.

From the accounts of Fahian and Houan Tsang who describe twenty monasteries (some as old as Asoka) as standing in their time as well as other buildings, some Buddhist, some Hindu, there can be no doubt of a rich Antiquarian harvest from any properly conducted excavations.

The following extract of a letter from Colonel Cunningham to Mr. Bayley was also read:—

“I was glad to receive your letter of the 17th with all its information about coins and inscriptions.

I duly received Rajendra's translation of the Wardak inscription. I think that he has given the general scope of the inscription, but he has certainly erred in many of the details, as several of his readings are quite inadmissible. What does he mean by saying that I read the figure  $\eta$  as 3? I read  $\eta 3 3$  as 331; and now for the proof that this is the correct reading and that the date is in the Seleucidan era—I read the opening of the Wardak inscription as “*San 331 Attamisiyasa divasa vrehi 14*”—“In the year 331, on the fourteenth day of the increase of Artemisias.” What do you think of that reading? Artemisias was the seventh of the Macedonian months, and if the Seleucidan era was in use, we ought to find the names of the Macedonian months also. Now turn to Ariana Antiqua, to the ink inscription from No. 13 Tope at Hidda, which I read

*San  $\times \times \eta$  Māse Apilaësa vrehi dasami.*

In the year  $\times \times \eta$  on the 10th of the increase of the month Apel-læus.” A careful examination of the original might perhaps show Apileyasa as the true reading. The word *s'arira* (relic) occurs shortly after the date in this inscription.

Inscription No. 3, Plate IX. of Thomas has the same year  $\times \times \eta$  but I read the remainder of the date doubtfully as

“*Māsa Attamisiyasa Vrehi 1.*”

I have an impression of this inscription which differs in some letters from Thomas's copy. Another inscription of which I possess a copy, given to me by Captain Robinson of the Engineers, opens with a line which I read without much hesitation as follows.

*San 5 Māsa Tsattikasa divasa Vrehi 3.*

In the year 5 on the third day of the increase of the month Xanthikos.

In all these inscriptions it is observable that the word *māsa* precedes the name of the month, whereas in my two Yusufzai inscriptions, in which the Hindu months are used, the word *māsa* follows the name of the month. This may be a useful hint for the reading of other dates.

In Court's Manikyāla inscription the name and day of the month are given at the end, I read them as

*Kāttikasa māsa divasa 3.*

"On the 3rd day of the month of *Kārttika*."

The date of the Manikyāla, Hidda, and Thomas No. 3, Plate 9, inscriptions, is the same, namely  $\times \times \cap$  which I incline to read as 144 from right to left, and I would refer the erection of the three topes to the period of Kanishka's conversion to Buddhism, say approximately 25 B. C. Then 25 plus 144 would give 169 B. C. as the initial year of the era, which may probably refer to the Scythian occupation of Bactriana and Sogdiana, which we know must have taken place about 170 or 160 B. C. during the time of Eukratides and Heliokles. The coins of the latter prince were copied by the Scythians, as well as those of Euthydemus.

*Vrehi*, I take to be equivalent to *Vridhhi* "increase." The reading of *Vrehi* I believe to be quite correct, but we cannot be certain of it until we find an inscription dated during the "decrease" of the month. Quintus Curtius, whose information was derived from the records of Alexander's companions, states that the Indians reckoned time by half-months, according to the increase or decrease of the moon. There is every probability, therefore, that I am right in my reading of the Macedonian months.

I have not time to go through the Wardak inscription just now, but I may note that I read the name of the hill mentioned in the first line, as *Khāsatamri Kotala*. And small hills in the Kabul valley are called Kotal as *Haft Kotal*, the seven hills, and *Khāsa* is the name of the Takt-i-Sulimān or *Khāsa-ghar*.

Regarding my explorations during the past season, I can only give you a rapid account. I visited Gaya, Bodh Gaya, Kurkihar,



Giryek, Rajgir, Bargaon (or Kundilpur), Bihár, Ghosrâwâ, Titrâwâ, Púnâwâ—the Barábar and Nágárijuni caves and Dharâwat, all in south Bihár. To the north of the Ganges I visited Besárh, (the ancient Vaisáli) Bakhra, Kesariya, Laoriya, Navandgarh, Parharaona, Kasiya, Khukhundo, Kahaon, Hathiyada, Bhitari, and Sárnáth Benares. I closed work at Benares on the 1st of April.

At Gaya I got numerous inscriptions including one dated in the era of Buddha's Nirván. At Giryek I opened Jarasandha's tower and a small ruin close to it from which I obtained 83 lac seals with impressions of topes and the Buddhist formula, *Ye Dhármma*, &c.

At *Rajgir* (the ancient Rajagriha) I opened the central tope without any result, excepting the discovery of a narrow passage showing that the monks had easy access to the relics, and must have removed them when they were ejected from India. The cave called Son Bhándár in the Baibhâr hill, is beyond all doubt the celebrated cave in front of which was held the first Buddhist synod. In two inscriptions it is called *Subha Guha*, the auspicious cave.

Bargaon or Kundilpur is the ancient *Nálanda*. I found two inscriptions giving the name of *Nálanda*. The ruined mounds are enormous in size, and would perhaps repay excavation, one of them ought certainly to be completely excavated, but the work would not occupy less than six months.

At Bihar I copied the two Gupta inscriptions on the stone pillar. The lower one opens word for word the same as that on the Bhitari pillar.

At the Barábar caves I copied all the inscriptions. The oldest are of Rajah Dasarath dated in the 1st, 12th, and 19th years of his reign.

At *Besárh* I found the ancient Vaisáli. There is a ruined fortress 1,600 feet long, by 800 feet broad, with its ditch still in good order. There is also a tope, covered with Musalman tombs, and the ground to the south of the fort is strewn with large bricks. The building of the fort is attributed to Rajah *Bisál*.

Two miles to the north of Besárh stands the Bukhra Lion Pillar, and another ruined tope. Immediately to the south of the pillar there is a tank which is certainly the celebrated *Markata hrada*, or Monkey Tank, on the bank of which formerly stood the *Kuṭágára* Hall in which Buddha first made known his approaching Nirván.

At Kesariya there is a middle age tope of cylindrical form, standing on the ruins of an ancient hemispherical tope. The tope is attributed to Rajah Ben Chakravartti.

The two pillars bearing Asoka's inscriptions stand to the north and south of Bettiah. Hodgson's names of Radhia and Mathia serve only to mislead. Each of the pillars is called Laor (Lowr) and the adjacent village in each case is called *Laoriya*. The southern Laoriya is a small village, but it is close to the celebrated Hindu shrine of Ara Ráj Mahadeo, and is two miles distant from *Rarhia*, a small village to the west. The northern Laoriya is a large village. It is, however, to the north of Bettiah, a little west, instead of to the west a little north as stated by Hodgson, and it is at least fifteen miles from the Gunduk instead of being on its bank. From Prinsep's notice, I infer that Hodgson's information was derived from a native Múnshi who wrote in Persian. The native evidently shirked the Phallic name of Laoriya and substituted the names of other villages. Mathia is a tolerably large village two miles to the south-west of the northern Laoriya. The pillars themselves are objects of worship. I copied the two inscriptions which are generally in very good order. About half a mile to the south-west of the northern pillar there is a gigantic mound at least eighty feet high, and about four hundred feet in diameter at top. This is the ruined fort of *Navand-garh*, a name by which I would purpose to call the northern pillar, while the southern pillar ought perhaps to be called Ara-Ráj. North and South Laoriya are the simplest names, but perhaps Navand-garh Laoriya and Ara-Ráj Laoriya might be preferred. Under any circumstances Radhia and Mathia must be given up.

Immediately to the west of the northern pillar there are numerous earthen mounds, some of them from forty-five to fifty feet in height. These I take to be earthen Topes or Barrows, the most ancient form of the Stupa. Two or three of these should be carefully excavated. I dug up two of the numerous smaller mounds without any result. But, as both Major Pearse and Mr. Lynch have found relics in superficial excavations, I feel satisfied that the larger mounds on which brick buildings of some kind have once existed would well repay excavation.

At *Kasiya* I opened the cylindrical tope on the mound. This tope is a middle-age one, and the mound itself is the ancient tope. There is a second ruined brick mound to the eastward on the bank



of a jhil. This is still loftier being fifty feet in height. Both of these ruined topes should be opened. I am quite satisfied that these topes stand on the site of the celebrated Kusinagara. I surveyed the ground carefully. The Hirana Nadi (or Chota Gandak) once flowed close past the topes, and I found the village of *Anirudha* with a ruined mound immediately to the south of the topes. Anirudha was a cousin of Buddha, and the senior disciple present at his death, who conducted all the proceedings up to the arrival of Mahakasyapa. The plain between the topes is covered with low earthen tumuli from three to five or six feet in height. I opened three of them, but without any result, although they were said to be the tombs of gipsies!

*Khukhundo* is a very remarkable place. There are about twenty-five ruined mounds scattered over about one square mile, to the west of the village. The statues now existing about the ruins are Brahminical, chiefly of Vishnu. There is a small Jain temple, and there are several Jain figures scattered about. I opened one of the mounds and came upon the floor of a temple, with the *Yoni*, or receptacle of the *Lingam*, still standing in its original position. The temples have been overthrown by the trees which were planted close to them. These mounds would, I believe, repay the trouble of excavation. But the work could not be satisfactorily done under one month.

At Kahaon I found, close beside the pillar, the ruins of two small temples, one of which was still standing when Buchanan visited the place. The villagers informed me that it was overthrown by a Pipal tree, which I fully believe, from the appearance of the ruin which was lying in one mass, just as if it had sunk slowly down.

At Hathyâda, I found a pillar and stone elephant and tank of the time of Govinda Chandra of Kanoj, S. 1201.

At Bhitari, I made a copy of the inscription on the pillar, which is in a worse condition than when I first saw it, in January 1836, and one portion of the inscription has peeled off. I made an excavation at its base, and found a brick stamped with the name of Sri Kumara Gupta. On making enquiry, I found that bricks thus inscribed are frequently found amongst the ruins, and I soon obtained four more broken bricks with portions of the same inscription. This discovery shows that Bhitari must have been a favourite place of Kumâra Gupta. All the mounds have been covered with Musalman tombs. There is an old stone bridge with painted arches built

by the Musalmans with stones stolen from temples. There are also some fine pieces of sculpture of the age of the Guptas.

At Sárnáth Benares, I completed a survey of the ruins and copied all the letters roughly cut on the stones of the great tope as mason's marks. These point to the age of the Guptas as the period when the tope was *begun*.

During the next season I propose to visit Kausambi, Sultanpur, Fyzabad, Sahetmahet, Kanoj, Pamkissa, Mathura, Bhabra, Delhi, and Khalsi Kangra. I shall perhaps pay a visit to Rohtâs while my camp is proceeding towards Mathura, and if time permits I will pay a visit to Sangala in the Panjab.

My principal coin acquisition since I last wrote to you, has been a tetradrachm of Pantaleon. *Obverse*,—Bare diademed head of the King to right—very like Agathokles, with a fuller and larger head, but with the same remarkable nose within a circle of small dots; *Reverse*, Jupiter *seated* and holding the Diva-triformis, or three-headed Hekate in his right hand—Legend, Basileôs Pantaleontos. The coin was covered with oxide when found, and was very roughly treated before I got it. But it is still in very fair condition; particularly the *Obverse*, which is remarkably bold and the head highly raised.

I have an obolus of Alexander the Great, weighing  $11\frac{1}{2}$  grains, a perfect beauty, and the only coin of this size of the Great Conqueror of which I can find any account.

A new gold coin, weighing 74 grains, has also come into my possession. *Obverse*,—a horseman with legend (Ha) rsha Deva; *Reverse*: Lakshmi seated on a lotus throne. It may perhaps be a specimen of Harsha Deva of Kashmir.

I have also a very good didrachm of Menander, with the head helmeted, a drachma with *Obverse*: helmeted head, the helmet wreathed,—and *Reverse*: a cock and legend ΣΩΦΥΤΟΥ. I believe this coin belongs to Tyre, which for a short period was under the rule of Judges,—“*Suffetes*.”

I have obtained the seal, with an impression of Buddha's feet on an altar, and accompanied by two attendants with joined hands. The name of the owner of the seal, I have not yet been able to make out.”

A letter was received from Major Pearse, containing a communication regarding Buddhist remains in upper India.



A letter from Babu Nundo Lal Bose, intimating his desire to withdraw from the Society was recorded.

The following gentlemen, duly proposed at the last meeting, were balloted for, and elected ordinary members.

Babu Dhunpati Singh Dooghur.

S. B. Partridge, Esq., M. D.

The following gentleman was named for ballot at the next meeting.

Dr. Bhau Daji, Bombay,—proposed by Dr. F. E. Hall, seconded by Mr. Cowell.

The President proposed on the part of the Council that the Right Hon'ble the Earl of Elgin and Kincardine should be requested to become the patron of the Society.

Resolved that a deputation consisting of the President, Vice-President, and Secretaries, be appointed to wait on His Excellency and prefer this request on the part of the Society.

The nomination of Col. R. Strachey to be a member of the Council vice Col. Yule, as reported at the last meeting, was confirmed.

The Council reported that they had appointed the Hon'ble C. J. Erskine a member of their body, vice Sir Bartle Frere, and that Col. Strachey had been added to the Natural History and Meteorological Committees.

They also reported that they had appointed a Committee of Papers as provided by Rule 77, to consist of the following members:—

E. C. Bayley, Esq., and Col. R. Strachey.

With reference to the proposed amendment in the rules notified by the Council at the last meeting, and referred back to them for report under the provisions of rule 43; the following report was submitted.

#### REPORT.

The Council beg to explain as follows their reasons for proposing the adoption of the amendments in the code of Byc-Laws of which notice was given at the last meeting.

##### 1st Proposal.

To amend rule 43, by the insertion of the words “unless originated by the Council” after the word “then” in line 5.

By this amendment it is intended to obviate what appears to be a needless delay in re-submitting to the Council propositions which have emanated from them, and on which they can conveniently report at the time of notifying them at a General Meeting.

## 2nd Proposal.

To add the following clauses to rule 46.

“The Council shall have the power of appointing any other day not later than that day fortnight, for the annual meeting.”

“After the termination of the regular business of the annual meeting, the meeting may be considered an ordinary general meeting.”

Under the rule as it now stands, the annual meeting must be held on one particular day and on no other. Experience has shown this to be inconvenient.—The Council, therefore, propose that a limited discretion shall be conferred on them to alter the day when it appears expedient to do so.

The object of the 2nd clause proposed in this amendment is to give greater interest to the January meeting. Few members are found to attend when the business is confined to routine official statements and reports.

## 3rd Proposal.

To omit clause 1 of Rule 60, which provides that the names of visitors allowed to be present at a meeting shall be read aloud by the chairman.

This rule has fallen into abeyance, and as it is not considered desirable to enforce it, the Council recommend that it should be cancelled.

Resolved that the July meeting be made special to decide on these proposals.

The Council submitted the following report from the Meteorological Committee, and requested authority to address Government in the sense of the Committee's recommendations.

The Committee having had under their consideration the general measures to be adopted to further the objects with which they are specially concerned, have come to the following conclusions.

The value of the study of meteorological phenomena in a scientific and abstract point of view needs no discussion. Nor is the practical importance of this science in any degree less great than that of any other branch of physical knowledge.

Every where the occupations of man, whether on the land or on the sea, are intimately bound up with the changes of the seasons, with the fall of rain, with the directions and forces of the winds, and



his very existence may be said to depend in great measure on the operation of atmospheric influences. The immediate connexion of health with climate is brought home to every one. Any progress made in a clear appreciation of the laws that regulate these phenomena, will therefore more or less directly become of real practical utility to us all. It is not intended to be said that we are ever likely to be able to bend the forces of nature as brought into play in atmospheric changes, so as to regulate the seasons or the winds to our will, this of course is unreasonable. But to know what is probable, to foresee what is the inevitable result of certain antecedent causes, is what we may expect. Indeed this practical application of meteorological science is already taking a very definite form, and the reports of the meteorological department of the Board of Trade in London are now generally accepted as giving a fair approximation to the course of the winds and weather for a day or so at least in advance, and as such are daily becoming of more practical utility to the mercantile world.

In India where the accidents of the seasons, so to speak, are developed with the intensity peculiar to tropical regions, there can at least be no smaller degree of value in such practical applications of science than in Europe. And to those who carry in their recollection the horrors of the late famine, it will be needless to say how inestimable a benefit would any thing be that would enable us to foresee these terrible calamities, and to prepare to meet them. Nor is there any thing at all unreasonable in anticipating that as the application of scientific knowledge now enables the sailor to foresee and avoid what used to be thought the irresistible and fatal hurricane, so this knowledge may be equally applied under other circumstances in enabling us to foresee and avoid what now seems the equally irresistible and equally merciless desolation caused by drought.

But the necessary precursor of the practical application of any science, is a careful, laborious and intelligent study of the actual phenomena; and it is obviously to this means that we must look here as elsewhere.

Nor need the intensity of tropical storms, or the extreme irregularity of the rain, which in one year will fall in a flood, while in another it will be scanty to such a degree as to create a famine, cause us to entertain any especial apprehension that we may there-

fore be unable to trace back their causes. For it is certain that in proportion as effects are extreme, causes are in fact strongly marked, whether we see them or not.

In truth, all meteorological phenomena are more or less directly dependent on the action of the sun on the earth's surface, and just in the same proportion as the power of the sun is great in a tropical country, so are atmospheric phenomena strongly marked, and so have we a right to expect greater facility in investigating their laws.

It is indeed, we believe, to observations made in tropical countries that the science of meteorology will eventually be indebted for any great advance that it may make.

Having these views, we are strongly impressed with the real importance of the study of this branch of science in India, and we hope that something may be done to give method and consistency to the many unsystematic and independent series of observations that are in fact now made in various parts of the country under various agencies.

The most important meteorological observations made in the Bengal Presidency are those of the Surveyor General's Department at Calcutta. They have been maintained for many years with all reasonable precautions to secure accuracy, so far as we are informed, and we feel that we are much indebted to the Government for them. Other similar series are made at Bombay and Madras. But till now we have never had any really systematic observations of this sort anywhere in the interior of the great continent of India under British rule. There have been many isolated series for short periods which are of a certain value, but for the purposes of science it is most important that the observation should be made at one and the same time over a large area, and in such a manner as to be really comparable one with another, which is very far from being the case in most of the old registers.

Next we may mention the observations made on the ships either of the Government or of private persons. With some little additional attention, these might be made of the highest utility as contributions to our knowledge; at present they can hardly be said to be brought into the common stock at all.

Besides the more systematic registers, there are many other re-



cords of this sort kept up which are of considerable value and might be made much more so with a very little arrangement. Thus a register of rain fall is kept, we believe, in every district in India, and has been so kept for a very long series of years. If made with fair care these records might be invaluable in a scientific point of view.

Again the medical officers of the Government, all over the country, are expected to keep certain meteorological registers in their hospitals. We have no doubt that these records are kept by many medical officers with great care and accuracy. But on the other hand it is not to be denied that a large number of them are made with no sufficient attention. Further they are not truly susceptible of comparison one with another from the very different ways in which they are kept; and as it is impossible to distinguish the good from the bad, the value of the whole of them is very much diminished if not altogether lost.

Lastly, we would observe that the very essence of the value of such observations is, that they should be brought into relation one with another.

If when made they are only to be put into a cupboard, they had far better not be made at all. If it be worth the trouble to make them, it is worth the trouble to use them; and using them means reviewing them, as a whole, in a regular systematic and scientific manner.

We do not conceal from ourselves that the difficulties in the way of such a methodic system of meteorological observation are great, but this is no reason for not attempting to overcome them.

On the whole, considering the circumstances of the country, and the fact that the great majority of observers will commonly be officers of the Government, what seems to us the course most likely to have a useful effect would be for the Government to constitute a Board of visitors of the Calcutta Observatory, for the purpose of making suggestions on this and kindred subjects. The difficulty of finding any individual with the scientific knowledge, theoretical and practical, necessary to make him a perfectly safe guide in such matters is acknowledged to be almost insuperable even in England. In India the thing is perfectly impossible, and the pressure of business on most persons interested in science is a further ground for trusting rather to a Board than to any individual adviser.

The Committee would wish it to be understood that the Board, the constitution of which they suggest, should have no power whatever excepting to offer its opinions on the subjects to which allusion has been made in this Report and perhaps on other kindred matters of science. It is not, however, for the Committee to offer any decided opinion as to any thing beyond the meteorological aspect of the questions. The Board would of course be purely honorary. It does not appear essential that all of its members should be residents in Calcutta or even in this Presidency.

The Committee have no doubt that if such a Board were constituted from the leading men of science in India, its recommendations would be received with thankfulness by the Government, and by all individual observers, and that such recommendations would practically carry with them sufficient weight to give that spirit of unity and method to all meteorological observations which is so entirely wanting at present, and which is so essential to any real progress in the science and its practical application.

Some remarks were made by Colonel Thuillier, on the subject of the recommendation which the Council proposed to submit to Government, and after a discussion in which Col. Strachey, Mr. Oldham, Col. Douglas, Mr. W. T. Blanford and other members joined, it was resolved that the Council be empowered to address Government in furtherance of the general objects advocated in the Report; but instead of a Board of visitors of the Calcutta Observatory, to recommend the appointment of a meteorological Committee, for the purpose of making suggestions on the best practical way of promoting those subjects.

The following report of the Phil. Committee was recommended by the Council and adopted.

#### REPORT.

The Philological Committee recommended to the Council that Pundit Nabadwip Chunder Goswami's offer be accepted to edit the prose Sankara-dig-Vijaya of Anantánanda Giri. The Society, last year, accepted a proposal to edit the poetic version by Mádhava, as it seemed at that time hopeless to obtain MSS. of the prose work, but the Secretary has lately obtained several MSS. through Dr. Hall and pundit Lingam Laksmoji of Vijayanagaram, and the printing of Mádhava's work, which had just commenced, has been stopped; and



it is now proposed that the older prose work should be edited in its stead.

Professor Wilson's "Hindu Sects" was mainly based on the present Digvijaya, and the Sarvadars'ana Sangraha of Mádhaváchárya which was published in No. 63 and 142 of the Bibliotheca Indica, and European scholars have frequently asked for an edition of Anantánandagiri's work. It contains the legendary history of Sankara Áchárya and his times, and amidst much that is misstated and untrustworthy, throws great light on the state of the Hindu mind at that period and the philosophical ideas then prevalent.

The work will occupy not more than three Fasciculi.

They also recommend that Mr. Cowell's offer be accepted to edit the Maitri or Maitráyani Upanishad with Rámatírt'há's commentary, and an English translation. It will occupy about two Fasciculi.

Dr. Weber in 1855 (*Indische Studien*, vol. 3, p. 480) remarked that the Society had published editions of all the more important Upanishads, with the exception of the Kaushitaki, Maitráyani and Váshkala. At the beginning of this year we published an edition of the first; the present proposal takes up the second. Of the third we have very slender hopes, as though its translation is given in D'anquetil du Perron, no traces of the Sanscrit original have as yet been discovered and the name does not occur in the very full Telugu list of Upanishads furnished by W. Elliott, Esq., and published in our journal for 1851.

#### ADOPTED.

Communications were received—

1. From Babu Gopeenauth Sein; abstracts of meteological observations taken at the Surveyor General's Office in November and December last.

2. From F. E. Hall, Esq., a paper containing some fragments of Ravana's commentary on the Rig Veda.

3. From W. T. Blanford, Esq., contributions to Indian Malacology., No. 3, containing description of new operculated land shells from Pegu, Aracan and the Khasi hills.

4. From W. Theobald, Jr., Esq. Notes of a trip from Simla to the Spiti Valley and Chormorre (Tohomoriro) Lake during the months of July, August and September last.

Extracts from this paper were read by the author, for which a vote of thanks was passed to him.

Mr. Oldham moved that the above papers be referred back to the Council for consideration, with a view to their publication.

Dr. Fayrer seconded the motion.

The President proposed as an amendment

That it be left to the discretion of the Secretaries in communication with the Committee of papers and in the conduct of their duty as Editors of the journal, to consider the question of their publication.

A discussion arose which was terminated by the adjournment of the meeting being carried on the motion of Col. Strachey.

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#### LIBRARY.

The undermentioned books and periodicals have been added to the Library since the meeting in April.

#### *Presented.*

Calcutta Christian Observer for April.—BY THE EDITOR.

Official, Classified and Descriptive catalogue of the contributions from India to the London Exhibition of 1862.—BY THE BOARD OF REVENUE.

Dickinson's address to members of the House of Commons—*Pamphlet*.—BY THE B. I. ASSOCIATION.

On the origin and authenticity of the Arian family of Languages. By D. Framjee.—BY THE AUTHOR.

Journal of the Statistical Society of London for March 1862, Vol. XXV. Part 1.—BY THE SOCIETY.

A list to the end of 1861 of the Fellows of the Statistical Society.—BY THE SAME.

Journal Asiatique, Vol. XVIII. Nos. 71 and 72.—BY THE PARIS SOCIETY.

Kumára Sambhava, 8th Sarga, edited by Pundit Prem Chandra Tarkabágísha with his commentary.—BY MR. E. B. COWELL.

Memoirs of the Geological Survey of India—Palæontologia Indica, Vol. I. Part 2.—BY THE SUPERINTENDENT OF THE SURVEY.

Ditto Ditto.—BY THE GOVERNMENT OF INDIA.

The Oriental Baptist for April.—BY THE EDITOR.

The Oriental Christian Spectator for January.—BY THE EDITOR.

Proceedings of the Royal Geographical Society of London, Vol. V. No. 5, and Vol. VI. No. 1.—BY THE SOCIETY.

Proceedings of the Royal Society of London, Vol. XI. No. 47.—BY THE SOCIETY.



Quarterly Journal of the Geological Society of London, Vol. XVIII.  
No. 69.—BY THE SOCIETY.

Reinaud's Memoire Sur les commencements.—BY THE AUTHOR.

*Exchanged.*

The Athenæum for January and February, 1862.

The Philosophical Magazine, Vol. XXIII. Nos. 152, 153.

*Purchased.*

The Annals and Magazine of Natural History, Vol. IX. Nos. 49, 50, 51.

The American Journal of Science and Arts, Vol. XIX. No. 97.

Abhandlungen fur die kunde des Morgenlandes Gesselschaft, Vol. II. No. 3.

Sanskrit Worterbuch, (Roth and Boehtlingk.)

Comptes Rendus, Tome LIII. Nos. 21 to 27 and Tome LIV. Nos. 1 to 8  
with an Index to Tome LII.

Flugel's Mani.

The Literary Gazette, Nos. 182 to 191 and No. 193 of Vol. VII. New  
Series.

Maynard's Dictionnaire de la Perse.

The Natural History Review, Vol. VII. No. 5.

Numismatic Chronicle and Journal of the Numismatic Society, New Series,  
Nos. 1 to 4.

The Quarterly Review, Nos. 220, 221.

Revue des Deux Mondes for 15th January, 1st February, 15th February  
and 1st March.

Revue et Magasin De Zoologie, No. 12 of 1861.

Reinwald's Catalogue Annuel Libraire Francais, Vol. IV.

Reeve's Conchologia Iconica, Nos. 214, 215 and 216.

Raverty's Translation of the Selections from the Poetry of the Afghans.

Spiegel's die altpersischen Keilingschriften.

Annales des Sciences Naturelles—Botanique, Tome XIV. No. 6.

Vuller's Lexicon, Fas. VI. Part 3.

Vendidad Sadi, Part 7.

The Westminster Review for January, 1862.

Windischmann's Sancara.

Journal des Savants for December, January and February.

LALGOPAL DUTT.

FOR JUNE, 1862.

The Meeting of the Asiatic Society was held on the 4th instant.

A. Grote, Esq., President, in the chair.

The Proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From Major J. C. Haughton a Silver coin found at Kurn Bil near Jubbulpore, and a Lead Siamese coin found at Tavoy.

The following is a letter from Major Haughton on the subject:—  
MY DEAR ATKINSON,

I have the pleasure of handing for addition to the Society's collection two coins.

The silver coin was obtained by me many years ago from the side of Kurn Bil near Jubbulpore. It is of a type common as far as Caubul. I think it is figured by Prinsep and described by Cunningham.

The large Leaden coin is an ancient Siamese one, part of a "treasure trove" dug up at the capital of Tavoy—Waydee—during the year 1857. The inscription is almost entirely illegible. I believe the figure on the obverse is intended to represent a dragon.

Believe me,

(Sd.) J. C. HAUGHTON.

2. From the Geological Society of London, several publications of the Society.

3. From the Imperial Academy of Vienna, several publications of the Academy.

4. From the Imperial Academy of St. Petersburg, several Nos. of the Memoirs and Bulletin of the Academy.

5. From Mr. Woodrow, two silver coins from the Sunderbuns.

6. From L. S. Jackson, Esq., C. S., a silver coin.

The following is a note on the coin by Mr. E. C. Bayley:—

This coin, which was found by Mr. L. S. Jackson, C. S., at Rajshahye, belongs clearly to the Bengal Pathan series.

Its inscription, though for the most part in good order, is not altogether legible; it bears a date, which in ordinary Arabic numerals, reads 933, on the strength of which Mr. Laidlay has assigned it (Bengal Asiatic Society's Journal Vol. XV. p. 333) to Mahmood Shah, son of Hussen Shah, the last of the Independent kings of Gour.



The chief difficulty in admitting this attribution is, that we are distinctly told in Stewart's History of Bengal, who, however, does not quote his authority, that Mahmood Khan succeeded his nephew, whom he murdered in 940 A. H.; and, secondly, that he died in 945, after a reign, including the period of his deposition, of five years.

This information is emphatic and precise. Mr. Laidlay does not seem to have had Stewart's History before him, as he confounds this Mahmood Khan with Mahmood, the son of Duria Khan Lohani, the distinction between each of whom and Mahmood Khan Lodi, all successively kings of Bengal at or about this period, is clearly drawn in a note at page 131 of Stewart's History. Moreover the obverse legend calls the king "Gheiasuddeen," a title which there is nothing to show, as far as I know, that Mahmood Shah ever assumed, and the word in the obverse legend, which Mr. Laidlay read as "Abool Mozuffer," cannot, on the present coin, be so taken. I at first read it as Ibn Toghlak, and for this reason was inclined to read the first figure on the date as a Bengali seven, and so to throw the coin back by two centuries,—considering the obverse inscription as that of Mahomed bin Gheiasuddeen Toghlak of Delhi, who was also the Suzerain Sovereign of Bengal, and believing the reverse to bear that of Bheiram Shah, whom Mahomed Toghlak made king of Bengal at Sanargaon in 725 or 726 A. H., and who died in 739 A. H.

But I must confess that the concluding formula of the reverse legend (Khallad Allah Mulk wa Sultanat) comports better with the later date, as it has I think been found hitherto on no coins earlier than those of the Lodi Dynasty.

Still the discrepancy of dates is almost too great to be accidental. To Mr. Laidlay's reading, (Nazir Shahi) moreover of the central legend the present coin gives little colour.

Mr. Laidlay distinctly says that he had several specimens and varieties of the coin before him while writing; it is probable, accordingly, that his attribution had better grounds than the sole coin which he has figured, would afford.

The attribution of the coins must therefore I think be considered open to future revision.

Read a letter from Mr. Stainforth, requesting that his withdrawal from the Society might be cancelled.

Agreed to.

Read the following letter from Mr. E. C. Bayley, Secy. to Govt. of India, in the Home Dept. :—

FROM E. C. BAYLEY, ESQ.,

*Secretary to the Government of India.*

TO W. S. ATKINSON, ESQ.,

*Secretary to the Asiatic Society.*

*Dated Fort William, the 22nd May, 1862.*

Home Department.

SIR,—With reference to the correspondence noted in the margin,

From the Asiatic Society No. 308, dated 8th October, 1858. I am desired to inform you that, in the opinion of the Governor-General in Council,

To ditto in reply No. 2700, dated 8th December, 1858. the time has arrived when the foundation of a Public Museum in Calcutta, which

has been generally accepted as a duty of the Government, may be considered with a view to its practical realization, and when the proposition which emanated from the Asiatic Society in 1858, “for the foundation of an Imperial Museum, to which the whole of the Society’s collections, except the Library, might be transferred” may with propriety be entertained.

2. This proposition was made conditionally on the approval by the Society at large “of the locality, general arrangements, and managements,” of the Museum; and it is, therefore advisable at once to state generally the views of the Government on these points.

3. The Governor-General in Council considers it to be essential to the success and good management of the Museum that the control of all the collections which it may contain should be always unreservedly vested in one and the same authority.

4. It is accordingly thought right that the whole of the collections, including those to be transferred by the Asiatic Society, those contributed by the Government, and all future additions to the Museum, shall be placed under the sole management of a Board of Trustees.

5. His Excellency in Council acknowledges the importance and value of the collections which the Asiatic Society has offered to transfer to the Public Museum, and the just claims which the Society has to share in the management of an institution, the foundation of which will be so much dependent on these contributions and on the previous labours of the Society.



6. The Governor-General in Council also fully recognizes the historic association connected with the Asiatic Society, its present high position and reputation, the great services which it has rendered to Literature, Archæology, and Science, and the assistance which it has afforded from time to time in developing the material resources of India.

7. His Excellency in Council, therefore, considers that it will be both just and appropriate to secure to the Society a liberal share in the control of the Museum, by constituting its representatives members of the Board of Trustees in such proportion, and under such conditions, as may be hereafter determined.

8. The Governor-General in Council is further prepared to furnish whatever accommodation may be requisite for the business of the Society, and for the reception of its Library, in close proximity to the proposed Museum. This accommodation would of course be assigned to the exclusive use of the Society, and would be given in exchange for their present premises, which under this arrangement, would become the property of Government.

9. With regard to the locality of the Museum, the Governor-General in Council, as at present advised, considers that it may most advantageously be placed on the site now occupied by the Small Cause Court in Chowringhee Road, and he is disposed to believe that some such building as that which has been recently proposed by Dr. Oldham (himself a member of the Society's Council) for the Government Geological Museum will be well adapted to the purposes of the General Museum.

10. His Excellency in Council would suggest "The India Museum" as an appropriate name for the Institution.

11. I am directed to submit the above outline of the measures which the Governor-General in Council would propose to adopt for the consideration of the Asiatic Society. If they meet the wishes of the Council and of the Members of the Society at large, His Excellency in Council will be happy to receive any suggestions upon matters of detail which the Society may wish to offer, with a view to secure more completely the interests of the proposed Museum, as well as those of the Society.

I have &c.,

(Sd.) E. C. BAYLEY,

*Secretary to the Government of India.*

The President intimated that the Council were considering the course which they should recommend the Society to pursue in reference to the offer now made to them by Government.

The Council reported that the election of Nawab Mohammad Khazam Ali Khan had been cancelled at his request.

The nomination of the Hon'ble C. J. Erskine to be a member of the Council, *vice* Sir B. Frere, was confirmed.

The Council reported that they had appointed the Hon'ble W. Grey, a member of their body, in the room of the Right Hon'ble S. Laing.

With reference to Mr. Oldham's proposal to amend rules 78 and 86, of which notice was given by him at the April meeting, the Council reported that they considered the adoption of these amendments would be inexpedient.

The President observed, that the purport of this proposal of Dr. Oldham's had been recommended to the Council by himself two years ago, but that he had not suggested any alteration in the rules, because it seemed to him that the present rule, which provided for an annual election of all office-bearers, was sufficient. All that was necessary was for the Council to act on his recommendation when preparing their next list of nominations for office. He was glad that the Council had concurred with him in this view, and hoped that his suggestion would be acted on at the next anniversary meeting.

The Council announced that, in accordance with the resolution of the last meeting, a deputation consisting of the President, the Vice-Presidents, and the Secretaries had waited upon the Governor-General pursuant to appointment to request him to become the patron of the Society, and that he had been pleased to accept the office.

A letter from Capt. W. A. Ross announcing his withdrawal from the Society was recorded.

Dr. Bhau Daji, duly proposed at the last meeting, was balloted for and elected an ordinary member. \*

The following gentlemen were named for ballot at the next meeting :—

Hon'ble T. J. H. Thurlow, proposed by the President, seconded by Dr. Maerac.

J. Gordon, Esq., C. S., proposed by the President, seconded by Dr. Maerac.



A. M. Monteath, Esq., C. S., proposed by Archdeacon Pratt, seconded by Mr. E. C. Bayley.

Captain Hyde, Bengal Engineers, proposed by Lieutenant-Colonel Thuillier, seconded by Major J. E. Gastrell.

Baboo Bhola Nauth Mullick, proposed by Moulavi Abdul Luteef Khan Bahahur, seconded by Mr. Atkinson.

The Hon'ble Major General Sir Robert Napier, K. C. B., proposed by Lieut.-Colonel Thuillier, seconded by the President.

Major Allen Johnson, Bengal Staff Corps, proposed by Lieut.-Colonel Thuillier, seconded by Mr. Atkinson.

Mr. W. Theobald, Junior, exhibited some celts which he had found in Bundlekund, and some chert implements from the Andamans, and read the following note on the subject:—

During the past cold season I had the opportunity of examining a portion of the country in which Mr. Le Mesurier first discovered celts (vide J. A. S. No. I. of 1861) and I was so fortunate as not only to collect a fair series of these weapons, but also to ascertain their extension upwards of 200 miles East of the Tons River which Mr. Le Mesurier in his Memoir considered as their boundary in that quarter. In other directions I had not the opportunity of tracing them, but that their range extends over a much larger area than is at present assigned them in Bundlekund is almost a certainty. Of the most marked varieties of these implements I shall give a short description, that any one so minded may satisfy himself of the precise identity of these celts with those found in Europe, in confirmation of which I may quote Mr. Oldham, whose acquaintance with stone weapons from Irish and European localities, is very extensive. There is something, however, very peculiar in the mode of occurrence of these weapons, which must be cleared up hereafter, for though they may be traced as far into Behar as I have stated above, it is only west of the Tons that they are plentiful; for (rejecting a dubious ease) I have not as yet obtained a single *perfect one* east of that river. The most natural explanation of this appears to be some superstition which induced men of old time to collect these relics of a still older age and convey them to the shrines and localities where they are now so abundant, so that celts collected over thousands of square miles are now accumulated about Karoi (Tirhowan or Kirwee) and its environs. This is of course a mere hypothesis, but agrees well with the scarcity of

other stone weapons compared with the multitude of celts, one *stone hammer* and a single *arrow head* only as recorded by M. Le Mesurier in addition to the numbers of celts scattered by threes and fours under pipal trees and in temples about Karoi. In the same neighbourhood a stone *punch* or *chisel* was procured by me and at Powari east of the Son River a *stone hammer*, which should encourage us to search more diligently for other relics of this most interesting *stone period*.

Very few of the celts in this collection offer any evidence of their ever having been fixed in handles, and where such has been the case, it was probably by a race of far more recent date than the original fabricators, for it is difficult to conceive a form less adapted for such a purpose than the typical celt or more liable to be always falling out: this difficulty is greatest in the case of the smallest celts and when we consider that a little flattening or notching the sides could have enormously facilitated their retention in any handle, it seems difficult to suppose that their original makers ever so used them. Can Nos. 1, 7 or 12, ever have been so used? No. 4 though merely chipped and not smoothed at the sides, presents the most perfect cutting edge of any in the collection, and what could have been easier than to fashion its sides if ever intended for a handle, or what form can possibly be suggested as *less applicable* for firm retention in a socket than that given to it, carefully wrought though it be? Some celts perhaps may have been fitted to handles, but hardly I think by their original makers, for reasons above stated, unless No. 6 is an exception. This celt presents a curious pit or depression on one side which might have been intended to receive the head of a handle and could certainly have contributed to its firm retention, though but slightly, and the general form is as in all celts singularly ill-adapted for such an application. The only other possible use I can suggest for this depression is, that of breaking nuts or fruit stones, which would not be so likely to fly off or slip aside if struck with the cupped side of this celt.

Celt No. 14 is the only one in the collection which exhibits any traces in fact of an adaptation fitting it for a handle, and it only differs from others in certain rude notches cut in the side, which certainly suggest the probability of their having been made to receive some sort of lashing. Their rough finish, however, suggests doubts of their being as old as the original date of the weapon. The several typical



forms of European celts may be recognized in our Bundelkund ones, though in the illustrated catalogue of Irish antiquities in the Dublin Museum there is nothing figured like the stone hammer or mallet found by me at Powari. The most probable use for which this article was designed was probably pounding, but it is doubtful if it was not furnished with a high celt-shaped handle, as just above the neck it has suffered fracture. It is also fractured at the base, seemingly from accidental usage, but enough remains of the smooth basal surface to indicate its form beneath, and show the purposes to which it was probably applied. The neck or shoulder is very smoothly finished, but more specimens are required to indicate the normal shape of the perfect instrument. Weight 1 lb. 9 $\frac{3}{4}$ oz. Only one other blunt weapon was found, which though perhaps used for similar purposes is much lighter and very different in shape, which is much that of a common native wrought iron pestle. It has a flat top at one end and probably a blunt edge at the other, though now much worn down. It was never very highly finished and weighs only 9 $\frac{1}{2}$  ounces. One of the most interesting celts in the collection is the very rude one which exhibits scarcely any signs of manufacture, and might readily enough be mistaken for an accidental fragment of rock. The natives, however, about Karoi possessed sufficient archæological acumen to perceive its nature, and have adorned it with a daub of red paint as Mahadeo, together with others of greater pretensions to divine honours than it. Whether accidentally or not, it exhibits the inæquilateral outline observable in many finished celts, and which was for some cause or other intentionally produced. The most curious point, however, about it is the presence of a few notches in the edge, which, as the stone is much decayed, may have originally been more conspicuous. That they are notches there is no doubt, but to have served any purpose, they must once have been much deeper, when they might have acted as a rude saw, the only instance of such a tool in stone I am acquainted with. Of many score celts, this is the only one of this rude type I have seen. The one marked from Debru ghat on the Soane is perhaps as unfinished, but it may once have had a finer edge, and its claims to be considered a celt are not conclusive.

The small fragment from Sibdilla is interesting as showing how certainly the merest portion of a celt may be recognised, as regarding this fragment, small as it is, there can be no doubt; and as proving

incontestably the former extension of these relics, on a very large area, as Sibdilla is a town of Behar not far from the hills, but 200 miles east of the Tons and the celt district proper about Karoi or Tirhowan.

Most of the celts ~~it will be seen~~ once possessed a very sharp edge, but there are some in the collection as Nos. 12, 13, 17 which though well-finished, never seem to have been ground down to a cutting edge and were probably used for other purposes than the sharp edged ones, though what precise use that was, can scarcely be guessed at. For comparison with these implements, I have laid on the table a few stone chips for which I am indebted to Major Haughton from the Andamans, the most finished of which might have been intended for arrow-head, but the majority of which chips seem merely intended to be used with the fingers in dividing fish or flesh. The round stone is also from the same quarter and seems to have been used for much the same purposes as the stone hammer from Powari. The four chips marked with a cross may have very well been intended for tipping arrows, to be used only against fish, but none of them would have been very effective against the Andaman pig or indeed any land animal. As, however, the Andamanese chiefly depend on fish, which they shoot with arrows for their food, Major Haughton is probably correct in regarding many of these chips as arrow-heads, though of a far slighter character than the arrow-heads which are usually found accompanying celts. The small agate fragment from Behar bears the appearance of being the remnant of a larger shear, and whether intended as an arrow-point or not, is, there is little doubt, an artificially formed piece of stone.

A lump of chert from which chips have evidently been struck off was found by Major Haughton together with the chips in a native encampment and but from the place it was found in, would never have attracted notice, though on examination it is clearly enough seen to be the parent of chips, such as accompany it. The following table gives the weights and dimensions of the long and short axes and thickness of twelve selected celts, all from the Karoi district, varying from 4lbs 9 oz. to 2 oz. 335 Grs.—the great bulk of the collection, however, ranging from  $\frac{3}{4}$  to  $1\frac{1}{2}$  lbs.

*Table*





*Figs: 1 to 12 one fifth of the natural size*





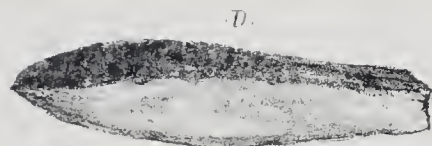




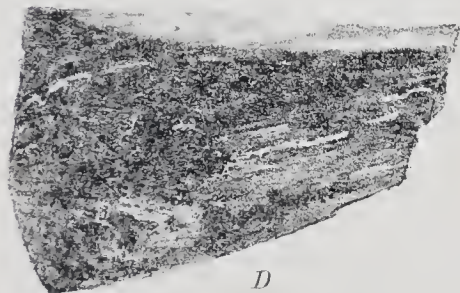
*limestone fragment very rudely shaped.*



*Hammer from Powait East of the Son,  
The dotted line shows the fractured portion.*



*Fragment of a Celt from Sibdilla in Behar  
200 Miles East of the Vene*



*Natural size*



PLATE OF CELTS TO ACCOMPANY MR THEOBALD'S NOTE ON CELTS FROM BUNDULKUND

*Figs. A.B.C. Half of the natural size  
All are from the Harwar district except E*





|       | <i>lbs.</i> | <i>oz.</i>      | <i>gs.</i> | <i>Length.</i> | <i>Breadth.</i> | <i>Thickness.</i> |
|-------|-------------|-----------------|------------|----------------|-----------------|-------------------|
| No. 1 | 4           | 9               | 0          | 10             | 4               | $2\frac{4}{8}$    |
| „ 2   | 3           | $4\frac{1}{2}$  | 0          | 10             | 4               | 2                 |
| „ 3   | 2           | 9               | 0          | $8\frac{2}{8}$ | $4\frac{2}{8}$  | 2                 |
| „ 4   | 2           | $1\frac{1}{2}$  | 0          | $7\frac{4}{8}$ | $4\frac{5}{8}$  | $1\frac{5}{8}$    |
| „ 5   | 1           | $9\frac{1}{2}$  | 0          | $6\frac{5}{8}$ | $3\frac{2}{8}$  | $1\frac{5}{8}$    |
| „ 6   | 1           | $1\frac{1}{2}$  | 0          | $5\frac{6}{8}$ | $2\frac{5}{8}$  | $1\frac{4}{8}$    |
| „ 7   | 0           | $18\frac{3}{4}$ | 0          | $4\frac{1}{8}$ | $3\frac{2}{8}$  | $1\frac{2}{8}$    |
| „ 8   | 0           | 8               | 150        | 4              | $2\frac{3}{8}$  | $1\frac{1}{8}$    |
| „ 9   | 0           | 5               | 85         | $3\frac{6}{8}$ | 2               | 1                 |
| „ 10  | 0           | 3               | 280        | $2\frac{2}{8}$ | $1\frac{6}{8}$  | $1\frac{1}{8}$    |
| „ 11  | 0           | 3               | 275        | $2\frac{6}{8}$ | $1\frac{6}{8}$  | $0\frac{7}{8}$    |
| „ 12  | 0           | 2               | 335        | $1\frac{7}{8}$ | $1\frac{6}{8}$  | $0\frac{7}{8}$    |
| „ B.  | 1           | $9\frac{3}{4}$  | 0          | $4\frac{5}{8}$ | $2\frac{5}{8}$  | $1\frac{5}{8}$    |
| „ C.  | 0           | $9\frac{1}{2}$  | 0          | $3\frac{7}{8}$ | $1\frac{7}{8}$  | $1\frac{1}{8}$    |

The material of which these stone weapons from Bundlekund are manufactured differs somewhat in mineral composition and texture, but is, I believe, without exception selected from the geological group named 'Semries' by Professor Henry Medlicott in his report on the district. A sort of greenstone is usually selected, but sometimes a more distinctly schistose rock, and in one case (Fig. A,) a piece of limestone has been used, though in the highly finished ones only the harder and better adapted stones seemed to have been used.

The small fragment from Sibdilla is made of a softish schist ill suited for such a purpose and which has evidently broken along a natural flaw or parting in the stone.

What is remarkable is, that, abundant as quartzite is, it has never been used for the manufacture of celts, though perhaps quartz weapons, especially of small size, may eventually be found. Neither have I ever noticed any celt manufactured from the compact Vindhyan sandstone of the country in which they occur. Too little is, however, known at present of these relics to base any reliable surmise on, and I shall therefore refrain from any further remarks, beyond expressing a hope that the notice will serve to stimulate inquiry, and prove what an interesting field of archæological research lies, as it were, at our doors, and how much light a little energy and zeal may be expected to throw on the unwritten history of the Archaic races of men in India.

Mr. Theobald also exhibited an engraved figure of Athene Pro-

maehos on red cornelian of Greek execution, from the North-west; being, according to Colonel Cunningham, a copy of the celebrated statue by Phidias in the Parthenon.

Communications were received—

1. From the Venerable Archdeacon Pratt, a memorandum showing the final result of his calculation regarding the effect of local attraction upon the operations of the Great Trigonometrical Survey of India.

2. From Bábu Gopee Náth Scin, an abstract of Meteorological Observations taken at the Surveyor General's Office, in the months of January and February last.

3. From Captain H. G. Raverty, an account of Upper and Lower Suwat and the Kohistan to the source of the Suwat river, with an account of the tribes inhabiting those valleys.

4. From Bábu Rajendra Lal Mitra, a note on some Bactro-Buddhist relics from Rawul Pindee.

Bábu Rajendra Lal Mitra having read this paper, Mr. E. C. Bayley advanced some reasons which led him to differ from the author in his determination of an inscription upon one of the relics. The original paper and Mr. Bayley's comments on it will appear in the Journal.

The Librarian submitted the usual monthly report.

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#### LIBRARY.

The following are the accessions to the Library since the meeting held in May last.

#### *Presented.*

Annals of Indian Administration, Part 1 of Vol. VI. for March 1862.—  
BY THE BENGAL GOVERNMENT.

Annual Report of progress and expenditure in the Public Works Department for 1860-61.—BY THE GOVERNMENT OF INDIA.

The Proceedings of the Bethune Society for 1859-61.—BY THE SOCIETY.

The Oriental Baptist for May 1862.—BY THE EDITOR.

The Calcutta Christian Observer for May 1862.—BY THE EDITOR.

Transactions of the Zoological Society of London, Vol. IV. Part 7.—BY THE SOCIETY.

The Proceedings of the Zoological Society of London—Part 3 of 1860, and Part 2 of 1861.—BY THE SAME.

The Transactions of the Linnean Society of London, Vol. XXIII. Part 1.—BY THE SOCIETY.



Journal of the Proceedings of the Linnean Society—Zoology, Vol. IV.—No. 16, Vol. V.—Nos. 17, 17,\* 18, 19 and 20—Botany, Vol. IV. No. 16, Vol. V.—Nos. 17, 18, 19 and 20 with a supplement to Vol. IV. and two supplements to Vol. V.—BY THE SAME.

List of the Linnean Society of London for 1860.—BY THE SAME.

Proceedings of the Geological Society of London, several parts from 1826 to 1844.—BY THE SOCIETY.

The Quarterly Journal of the Geological Society, Vol. XVII. Part 4.—BY THE SAME.

Transactions of the Geological Society of London, Vol. V. Parts 1 and 2, Vol. VII. Parts 1, 2 and 4.—BY THE SAME.

Philosophical Transactions of the Royal Society of London, Vol. CL. Parts 1 and 2.—BY THE SOCIETY.

List of the Fellows of the Royal Society to 30th November, 1860.—BY THE SAME.

Memorie della Reale Accademia Delle Scienze di Torino, Serie Seconda—Tomo XIX.—BY THE ACADEMY.

Bulletin de l'académie Impériale des Sciences de St. Petersburg, Tome II. Nos. 4, 5, 6, 7 and 8 et dernier, Tome III. Nos. 1, 2, 3, 4 and 5.—BY THE IMPERIAL ACADEMY.

Mémoires de L'Académie Impériale des Sciences de St. Petersburg, VIIe. Série, Tome III. Nos. 2, 3, 4, 5, 6, 7, 8 and 9.—BY THE SAME.

Jahrbücher der K. K. Central Anstalt für Meteorologie und Erdmagnetismus, VII. Band, Jahrgang 1855.—BY THE ROYAL VIENNA ACADEMY.

Jahrbuch der K. K. Geologischen Reichsanstalt, Vol. XI. No. 2.—BY THE SAME.

Denkschriften der Kaiserlichen Academie der Wissenschaften—Mathematisch—Naturwissenschaftliche Classe, XIX. Band; Philosophische—Historische Classe, XI. Band.—BY THE SAME.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften—Mathematisch—Naturwissenschaftliche Classe, XLII. Band Nos. 27, 28 and 29, XLIII. Band, Heft I. Abth., 1, Heft II. Abth. 1 and 2, Heft III. Abth. 1 and 2, Heft IV. Abth., 1, Heft V. Abth. 1 and 2; XLIV. Band, Heft I. Abth. 2, Heft II. Abth. 2; Philosophisch—Historische Classe, Band XXV. Heft 5, Band XXVI. Heft 1 and 3, Band XXVII. Heft 1, 2, 3 and 4.—BY THE SAME.

Almanach der K. Academie der Wissenschaften, Vol. XI. for 1861.—BY THE SAME.

Archiv für Kunde österreichischer Geschichts-Quellen—Band XXV. 1 and 2 Hälfte—Band XXVI. 1 and 2 Hälfte, and Band XXVII. 1 Hälfte.—BY THE SAME.

Über den Ursprung der Meteorsteine, Von P. A. Kesselmeyer—*Frankfort A. M.* 1860.—BY THE AUTHOR.

Monatsberichte der Königlichen Preuss-Akademie der Wissenschaften Zu Berlin for 1860.—BY THE BERLIN ACADEMY.

Register für die Monatsberichte der Königlichen Preuss-Akademie der Wissenschaften Zu Berlin Vom Jahre 1836 bis 1858.—BY THE SAME.

Abdhandlungen der Königlichen Akademie der Wissenschaften Zu Berlin for 1860.—BY THE SAME.

The Journal of Sacred Literature and Biblical Record, edited by B. Harris Cowper, Vol. I. No. 1, New Series.—BY THE EDITOR.

Journal Asiatique, Cinquième Série, Tome XIX. No. 73.—BY THE PARIS SOCIETY.

Proceedings of the Royal Society, Vol. XI. No. 48.—BY THE SOCIETY.

Bijdragen tot de Taal-Land-En Volkenkunde van Nederlandsch Indië, Vierde Deel, 4e Stuk.—BY THE AMSTERDAM INSTITUTION.

Journal of the Royal Asiatic Society, Vol. XIX. Part 3.—BY THE ROYAL ASIATIC SOCIETY.

Journal of the Agricultural and Horticultural Society of India, Vol. XII. Part 2.—BY THE SOCIETY.

A Collection of Treaties, Engagements and Sunnuds, relating to India and neighbouring countries, Vol. I. containing the Treaties, &c., relating to Bengal, Burmah, and the Eastern Archipelago.—BY THE GOVERNMENT OF INDIA.

Memoirs of the Geological Survey of India—*Palæontologia Indica*, Vol. II. Part 1.,—The fossil Flora of the Rajmehal Series.—BY THE BENGAL GOVERNMENT.

Sketch of the Flora of the country passed through by the expeditionary force under Brigadier-General Chamberlain in April and May 1860, with a Map, 2 copies.—BY THE GOVERNMENT OF INDIA.

Vividhārtha Sangraha, Vol. VII. No. 80.—BY THE EDITOR.

Selections from the Records of the Government of India, Military Department, No. 3, containing Report on the extent and nature of the Sanitary Establishments for European Troops in India.—BY THE GOVERNMENT OF INDIA.

*Exchanged.*

The Athenæum for March, 1862.

The Philosophical Magazine, Vol. XXII. No. 150, Supplementary No., and Vol. XXIII. No. 154 for April, 1862.

The Calcutta Review for December, 1861.

*Purchased.*

Zoological Sketches, By Joseph Wolf, Second Series, Parts 1 and 2.

Journal des Savants for March 1862.



The American Journal of Science and Arts, Vol. XXXIII. No. 98.

Numismatic Chronicle No. 5 for March 1862.

Westminster Review for April, 1862.

The Literary Gazette, Nos. 195 to 198.

Natural History Review for April, 1862.

The Annals and Magazine of Natural History, Third Series, Vol. IX, No. 52.

Revue et Magasin de Zoologie Nos. 1 and 2 for 1862.

Revue des Deux Mondes, Tome XXXVIII. for 15th March and 1st April, 1862.

Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences, Tome LIV. Nos. 9, 10, 11 and 12.

Mahábháshya—Edited by Dr. J. R. Ballantyne, Vol. I.

Christianity contrasted with Hindu Philosophy—By Dr. J. R. Ballantyne.

Lectures on the Science of Language delivered at the Royal Institution—By Prof. Max Müller.

Makámát Hameedee.

4th June, 1862.

LA'LGOPA'L DUTT.

### *Report of Curator, Zoological Department, February, 1862.*

During the long interval that has elapsed since the publication of my last report, the Society's collection of *Vertebrata* has been largely increased, and we have been favoured with numerous valuable donations.

1. From Col. A. P. Phayre, Chief Commissioner of British Burmá, a large collection principally of bird-skins, collected mostly in the Tonghoo district of the valley of the Sitang and on the route thither across the hills from that of the Irawádi, in 1860. Also some specimens of mammalia, which are as follow.

VIVERRA MEGASPILA, nobis, *n. s.* (or distinguishable race). Flat skins from vicinity of Prome. There are four recognisable races of Asiatic Civet, all of which differ from the African *V. CIVETTA*, L., in the erectile mane commencing between the shoulders instead of between the ears. Three of them are of the same large size as the African species, the fourth being (so far as I have seen) constantly much smaller. One, *V. ZIBETHA*, L., is well known from Buffon's figure, and is at once distinguished from all the others by the comparative indistinctness of its body-markings. It is common in Bengal,

Nepal, Asám, Sylhet, Arakan, Siam, Southern China, and was obtained by the late Dr. Cantor in the Malayan peninsula, being noted by him from Pinang and Singapore. A second race, *V. CIVETTINA*, nobis, inhabiting Southern Malabar, quite resembles *V. CIVETTA*, except in the particular of the mane. A third race, *V. MEGASPILA*, nobis, has been confounded with *V. TANGGALUNGA*, Gray, but is as large as the preceding, and has the spots fewer and much larger, and entire for the most part (or shewing little tendency to group into *ocelli*); and on the sides they tend less to unite into vertical bands or stripes than in *V. CIVETTA* and *V. CIVETTINA*. Such are the specimens from Prome; and I think that the late Dr. Cantor possessed a similar one from Pinang (which he referred to *V. TANGGALUNGA*); while a third (stated to be Sumátran,) was assigned to *V. ZIBETHA* in Waterhouse's Catalogue of the Zoological Society's late museum.\* *V. TANGGALUNGA*, Gray, is always smaller (so far as I have seen), with much smaller and more numerous spots grouping more or less into *ocelli*; a comparatively broad black dorsal stripe, and tail somewhat peculiar in its marking. This race inhabits the Malayan peninsula, Sumátra, Borneo, Celebes, Amboyna, and the Philippines (from which last locality I have seen examples). All are very closely akin; but as races are easily enough distinguishable, and they do not appear to grade into each other; being about equivalent to those of *MARTES FLAVIGULA* noticed in J. A. S. XXVI, 316.†

*HELECTIS ORIENTALIS*, Horsfield. Skin from Prome; and skeleton and stuffed skin of examples procured at Rangoon, in which locality I have observed the species wild.‡ Referring to the figure of *H. ORIENTALIS*, (Horsf.), in the *Zool. Res. in Jáva*, I cannot perceive in what respect the *H. NIPALENSIS* differs; nor can I learn in what the *H. MOSCHATA*, Gray, of China, also differs. *H. ORIENTALIS*, (Horsf.), would seem to be the animal with somewhat abraded fur. The Society's museum contains fine examples from Sylhet and Arakan.

*SCIURUS BICOLOR*, Sparrman; *SC. FERRUGINEUS*, F. Cuv. (*Keraudrenii*, Lesson); and *SC. PHAYREI*, nobis. The second belongs to Arakan

\* *Vide* J. A. S. XVII, 1842, p. 344.

† *Martes Gwatkinsii*, C. H. Smith, from Másuri, would seem to be merely *M. FLAVIGULA* in summer vesture (*vide* P. Z. S. 1858, p. 516); but the Nilgiri race is, I believe, permanently black on all the upper parts. I find *MARTES FLAVIGULA* cited from the valley of the Amûr.

‡ Syn. *Melogale personata*, Is. Geoff., Belanger's Voy.; procured near Rangoon.



and Pegu, or essentially to the dividing range of hills which separate those provinces. The third is emphatically the Martaban Squirrel. I obtained it in the Martaban hills opposite to Moulmein, but never on the Moulmein side of the river; though Mr. Atkinson procured one lower down towards Amherst. (*J. A. S.* XXVIII, 275.) On the hills behind Moulmein, it is replaced abundantly by *Sc. ATRODORSALIS*, Gray, which, however it may vary, is readily distinguished from all its Burmese congeners by having conspicuously white whiskers. *Sc. HYPERYTHRUS*, nobis (said to be from Moulmein, but more probably from the hills bordering the Sitang valley), is very like *Sc. ATRODORSALIS*, but has black whiskers, the back, sides, and exterior of limbs, quite uniformly coloured, and no trace of the black patch upon the back.\* *Sc. PHAYREI* I found to be the common species of the Martaban jungles, as high up as I went, far into the Yunzalin district of Upper Martaban; and the only other Squirrel which I observed there was *Sc. BERDMOREI*, nobis, both near Martaban station, and far in the interior. This largest of the striped species is a thorough ground Squirrel, which never ascends a tree, so far as I have seen, but on alarm retreats to the under-wood; its tongue is remarkably long and protrusile. At Rangoon the only species that I observed was *Sc. PYGERYTHRUS*, Is. Geoffroy, which is the ordinary Squirrel of Lower Pegu; but high up the Irawádi, in the Shan hills east of Ava, and again above Ava, Mr. W. T. Blanford met with a peculiar race, *Sc. BLANFORDII*, nobis, *n. s.*, which resembles *Sc. PHAYREI* except in wanting the black stripe along the flank, and in having the entire upper-parts greyer or less fulvescent. The four paws are albescent-fulvous in both races, tending more or less to rufous; and both have the tails black-tipped, and the cinnamon hue of the lower parts extending as a median stripe along the under surface of the tail. Neither of these, too, has any ruddy colouring on the face and ears, as in *Sc. ATRODORSALIS* and *Sc. HYPERYTHRUS*. From *Sc. HYPERYTHRUS*, *Sc. BLANFORDII* is readily distinguished by its larger size, conspicuously black-tipped tail with pale line underneath, and also by the albescent-fulvous colour of the four paws above.† *Sc.*

\* We have specimens of *Sc. ATRODORSALIS* without the black dorsal patch; but the whiskers are white, and the general colouring, especially that of the tail, readily distinguish them from *Sc. HYPERYTHRUS*.

† Two additional specimens of *Sc. BLANFORDII* have since been examined, which have been taken to England by Mr. W. T. Blanford.

ATRODORSALIS would seem to be the characteristic Squirrel of Amherst province; and southward again, in that of Tavoy, the ordinary species would appear to be SC. CHRYSONOTUS, nobis; with also the pygmy striped SC. BARBEI, nobis; which is closely akin to SC. MCCLELLANDII of Sikhim and Butan. The only Squirrel-skin we have from Mergui is like SC. CHRYSONOTUS, but without a tinge of golden-ferruginous on the upper parts, though there is a trace of this hue on the sides of the neck and body: it nearly resembles an example from Malacca, which I have named SC. CONCOLOR; but this has no trace of the golden-ferruginous on the sides of the neck and body, nor a well defined black tail-tip as in the other.\*

Here it may be remarked that the CERVUS (PANOLIA) ELDI, Guthrie (*C. frontalis*, McClelland, *C. lyratus*, Schinz, *C. dimorphe*, Hodgson,—with horns a little abnormal as developed in captivity,—*Panolia acutirostris* et *P. platyceros*, Gray), is common in Pegu, ex-

\* The following are the ascertained SCIURI of British Burmá:—

1. SC. BICOLOR, Sparrman. The only species of the *giganteus* group inhabiting the range of territory; and found on all the hilly tracts from the E. Himálaya to the Straits of Singapore. Burmese specimens have very commonly a pale cincture, more or less broad, at the middle of the body.

2. SC. LOKRIAH, Hodgson. Eastern Himálaya; Khásyas; Arakan hills.

3. SC. ASSAMENSIS, McClelland; *Sc. Blythii*, Tytler. Abounding in Asám, Sylhet, Arakan, and in E. Bengal; common about Dacca.

4. SC. FERRUGINEUS, F. Cuv., *Mamm. Lithog.*; *Sc. Keraudrenii*, Lesson, *Zool. Voy. de Belanger*. Common in the hills of Arakan and Pegu.

5. SC. PYGERYTHRUS, Lesson, *ibid.* Abundant in Lower Pegu.

6. SC. BLANFORDII, nobis, *ut supra*. Valley of the Irawádi and neighbouring hills about Ava; perhaps not within the British territory.

7. SC. PHAYREI, nobis. Common throughout the province of Martaban.

8. SC. BERDMOREI, nobis. The common ground Squirrel of Martaban province; found also as far south as Mergui (?).

9. SC. HYPERYTHRUS, nobis. Hills bordering the valley of the Sitang?

10. SC. ATRODORSALIS, Gray. The common species of Amherst province; abundant on the hills behind Moulmein (certainly not Butan, as asserted by Dr. Gray. *Br. Mus. Catal.*)

11. SC. CHRYSONOTUS, nobis. The ordinary Squirrel of Tavoy province, if not also of the interior of Amherst province (*J. A. S. XXVIII*, 275). A permanent variety (?), or race, without the golden-fulvous colouring of the back, in Mergui province.

12. SC. BARBEI, nobis. The diminutive striped Squirrel of Tavoy, and of Mergui (?); closely akin to SC. MCCLELLANDII of the E. Himálaya. It also inhabits the interior of Amherst province; and, I suspect, Lower Pegu; and it is doubtless the SC. MCCLELLANDII apud Gray, from Camboja. *P. Z. S.* 1861, p. 137.

*N. B.* There can be little doubt that additional species inhabit the provinces of Tavoy and especially Mergui: and this sketch of the geographical distribution of the various races will doubtless have to be improved upon.

A SC. SIAMENSIS is described by Dr. Gray in the *Proc. Zool. Soc.* for 1859, p. 478; and several species from Camboja in *P. Z. S.* 1861, 371.



tending thence northward to the Munnipur valley : it is also in Siam, as I have been recently informed by Sir R. H. Schomburgk ; and the late Dr. Cantor obtained a fine skull with horns from Kedda, within the eastern confines of the Malayan peninsula ;\* but it does not appear to inhabit Martaban and the Tenasserim provinces. I repeatedly saw the venison of this species (the *T'hámine*) for sale in the Rangoon provision bazar, together with that of the Sâmur (or *Scháp*), Hog-deer (*Durai*, pronounced *Dray*), and Muntjac (*Gee*), indeed the four species together on one occasion ; but always frightfully hacked by the Burmese, who do not even skin the animal before chopping it up. In Moulmein the Sâmur is commonly brought to the bazar in two entire unskinned halves, with the entrails taken out ; and there also I remarked Hog Deer and Muntjac or 'Barking Deer' venison, but brought in less quantity than to Rangoon. With Major S. R. Tickell, at Moulmein, I saw a young living buck of the *T'hámine*, bearing its second horns, small, but of the typical or ultimate configuration ; and a skull with similar horns (of the same age) was presented through me to the Society by Dr. Prichard of Rangoon, procured in the provision-bazar of that place ;† the living animal is exceedingly like the Indian *Bárá Sing'ha* (*C. DUVAUCELII*) in all but the horns, but is inferior in size ; having the summer-coat bright rufous, with traces of *menilling*, more conspicuous in some does (as likewise in *C. DUVAUCELII* and *C. PORCINUS*). Among the drawings bequeathed by Gen. T. Hardwicke to the British Museum is one of a very spotted buck of *C. DUVAUCELII* from the Bengal Sundarbans. That this species does inhabit the Eastern Sundarbans, I have been assured ; and the winter-coat is much darker and browner, of coarser texture, and considerably elongated about the neck. The habits resemble those of the Indian *Bárá Sing'ha* : this animal being much more gregarious, and more confined to open glades in the forest, than are the other Deer of the same region. Lt. Eld has well described the habits of the species in the Calc. Journal N. H., II, 415. The horns of the Munnipur animal can generally be distinguished from those of the more southern race, by being longer,

\* Many years ago, Capt. Harold Lewis presented the Society with a fine pair of horns of this species on the frontlet, which he obtained at Pinang, and which were, doubtless (like those of Dr. Cantor), from the Kedda district.

† To Dr. Prichard, the Society is also indebted for the photograph of the two Andamánese, figured in Vol. XXX, 251.

smoother, and less branched; the brow-antler especially is more elongated; and the crown is usually bifid, or with but a slight third prong, instead of being strongly trifid, or in some instances with even a fourth large coronal prong; but I have seen southern examples of intermediate character, and one of the largest size which was well elongated. Col. C. S. Guthrie lately assured me that he had possessed a large Munnipur pair of horns which were quite single or unbranched, and the brow-antler in a continuous line with the beam.\* This is an exaggeration of the ordinary Munnipur character of horn. Mr. Hodgson's *C. dimorphe* I consider exceedingly doubtful as having been captured north or west of the Brahmaputra.

To Col. Phayre, we are further indebted for some loose horns of (Burmese) *Bos GAURUS*; and for (now in all) three skulls of bulls of *B. SONDAICUS*, all from Pegu, and an imperfect skin of a cow: the latter being of a bright chesnut-dun colour, and exhibiting the characteristic white patch on the buttocks.

As regards the former species, the Gaour seems to attain even a higher development in the Burmese countries than in India; not unfrequently, it would seem, attaining to 19 hands from the summit of the elevated dorsal ridge; and the horns, generally, are much more robust and considerably shorter, in both sexes, than in Indian Gaours.† A remarkably fine skull, with horns, of the latter (*minus* the lower jaw) in the Society's museum weighs just 30 lbs.; an equally fine skull of the Burmese race (*minus* the lower jaw), belonging to Col. A. Fytche, (Commissioner of the Martaban and Tenasserim provinces,) weighs 34 lbs.: both skulls of highly developed bulls, of course. From what I remember of a fine bull-skull, from the mainland near Singapore, I think that the horns were longer, as in the Indian race; but further observation is necessary of the Malayan animal, which probably resembles that of the Indo-Chinese region.‡

The *Bos SONDAICUS* appears to be common enough in parts of Upper Pegu, again in Mergui, and it occurs in Keddá, within the eastern confines of the Malayan peninsula, in Siamese territory; probably, also,

\* A small specimen (3rd year), thus characterized, he has since presented to the Society.

† This I partially remarked in J. A. S. XXI, note to p. 433.

‡ Some Burmese heads and horns are, indeed, quite similar to Indian specimens. Such an example is figured as "the head of a Tenasserim Bison," in Col. Low's History of Tenasserim. Jour. Roy. As. Soc., Vol. III, p. 50.



elsewhere in the Malayan peninsula, as likewise in Jáva, Báli, Lombok, and Borneo. The horns of a female I saw with Col. Fytche are precisely similar to those figured by Dr. Salomon Müller; but the skull of this sex is still a desideratum in the Society's museum. Capt. Lloyd (Assistant Commissioner of the Tounghoo district, valley of the Sitang), is now endeavouring to procure a perfect skeleton of a bull of this species for the Society's collection.\*

\* In the 'Journal of the Indian Archipelago' for May, 1852, p. 270, the late G. Windsor Earl identified the Banteng of Java with the (wild Ox) of the Malayan peninsula; but he merely gives the English appellations, and may have confounded *B. GAURUS* with *B. SONDIACUS*. Dr. Cantor knew only of *B. GAURUS* as indigenously wild in the Malayan peninsula. (*Vide J. A. S. XV*, 272.) The Count de Castelnau (French Consul at Bangkok) recently wrote me word from Singapore, that "The domestic cattle of Siam are of two races, one being the common Zebu, and the other humpless: the latter is the more common, and the horns of both are of very moderate size. I will write to Siam to get the horns and skull for you, and all possible information about the animal. The wild Ox is very rare in Siam: I only saw one, and it certainly belonged to *B. GAURUS*. In the Malayan peninsula there are *two sorts*, but only found in the central parts; and my collectors could not bring back specimens of such bulky animals. If you wish for the skulls, I will endeavour to obtain them for you."

Sir R. H. Schomburgk also writes—"The Buffalo is the animal used for agriculture and economical purposes in Siam. A murrain broke out some time since among them, and all export of them was forbidden. There is another kind of cattle here, to which you allude on Crawford's testimony: they are but small in size, and are quite different from the Zebu, not possessing the hump. I do not consider them indigenous. But the species to which you principally allude [I meant *B. SONDAICUS*,] is what I take to be the Gaour (*B. GAURUS*), roaming wild, and [illegible] in Camboja. I have never seen it, but possess a pair of horns, which I will forward to you with the skull of the kind of Ox that Crawford alludes to. You are probably aware that in the same way that the flesh of the Swine is forbidden to the Israelites and Mahomedans, that of the Ox and other substantial animals is interdicted to the Siamese [*vide J. A. S. XXIX*, 302]. The latter do not adhere very strictly to the ordinance; and, with the Americans residing here, we Europeans may taste occasionally some beef, though weeks may pass without it. Now I have addressed myself to the butcher who furnishes my house, and I have told him that I require the skull of one of the domestic cattle that Crawford mentions. He told me that there were not any now in Bangkok, but he would proceed into the interior where he might get them if I procured him a passport from the Siamese authorities. I have done so, and we must now await the result. If he succeeds, I shall insist upon being present when the animal receives its death-blow, to ensure its individuality." I have written to my very old personal friend, Sir R. H. Schomburgk, to request that he would send a bull-skull, if procurable, rather than that of an ox.

As our knowledge of the Tsoing or Banteng (as a continental species) is still but scanty, the following notice of it may be deemed worthy of transcription. Mr. H. Gouger, in his 'Personal Narrative of Two Years' Imprisonment in Burma' in 1824-6 (published in 1860), was returning from captivity, when he "landed on the right bank of the river [either the Gyne or the Attaran] with three boatmen, leaving the fourth in charge of the jolly-boat. As the forest was dense, and as we had to make a pathway for ourselves through the brushwood where there was any, we walked in Indian file, one of the men leading the line, in which I followed second, the others bring up the rear. To avoid the danger of losing our way, we took the usual precaution of chipping the bark. \* \* \* We had not proceeded in this way more than a quarter or half a mile, when my leader, an



The Gayál or Mit'hun (*BOS FRONTALIS*) I have vainly endeavoured to trace southward of Akyab; but it abounds (in the domestic state)

intelligent wood-man, stopped suddenly and dropped on his knee, a backward motion of his hand told me to be quiet, I followed his example, repeated the signal to those behind, and so we all remained still, until the leader, without venturing to look round, motioned me forward with a finger. The nature of the ground enabled me to creep in advance without the noise even of my footstep, until I reached the spot where the man was hidden.

"A beautiful spectacle now opened upon us. A few bushes screened us from a circle of verdant herbage, which had apparently been covered with water in the rainy season, and in this little shallow basin were to be seen a herd of wild Cows quietly grazing on the rich pasture [*i. e.* not *browsing*, like so many Gayáls]. The herd might have numbered about sixteen or eighteen, and from the placid, unconcerned manner in which they enjoyed their food, appeared to have no sense of danger or knowledge of the proximity of any unusual intruders. Not so the bull; when I first caught sight of him he was motionless as a statue, his bold front turned towards us, and his head and neck stretched so erect towards the sky that his nose was perpendicular with his fore-legs. He could not see us, but he evidently smelt us, though there was no wind to carry the scent in his direction. It was a hot day and a dead calm. The sight was beautiful beyond description.

"I remained gazing at them in deep silence and admiration for more than half a minute, my double-barrelled gun laden with balls was in my hand, and I could easily have brought down the bull, as he was not more than thirty yards off; but the sight was too engaging, and I let him off. On a sudden the beautiful statue seemed to have come to the decision that there was danger in the wind, as he set off at full gallop into the forest in the direction opposite to me; the cows, who to the last manifested not the slightest sense of danger, left off feeding in a moment and followed their lord at full speed, the crashing of the brushwood for some time after we lost sight of them attesting their alarm. I did not know at the time what a rare sight I was witnessing, one which I was afterwards told by an accomplished naturalist had not been enjoyed by any European traveller before. This was unfortunate, as, had I known it, my observations would have been more minute. The following facts, however, may be depended upon:—

"The cows were small in stature, considerably smaller than the breed of Alderney [?]; their shape and figure were light and elegant; they did not possess humps, like the domestic cattle of India; they were, without exception, of the same colour, a light reddish-dun; their beautiful slender legs being, all four, white below the knee. The bull was rather larger and thicker-set than the cows, he had a respectable dewlap, which, together with the breast and shoulders, was covered with longer dark hair, approaching to black. I do not well remember the horns, but I am inclined to think that they were not long, or I should most likely have remarked them. Both the bull and the cows were exceedingly sleek in their coats, which shone as though they had been subjected to careful daily brushing."

The above is the most detailed description that I have yet met with of the *Tsoing* of the Burmese countries, and (so far as it goes) it tallies sufficiently with *B. SONDAICUS*; the bull evidently young, with horns not fully developed, and in progress of assuming the blackish colouring of the body.

On the W. coast of the N. E. of Borneo, near Quabong, remarks Mr. Spencer St. John—"Along this beach, herds of wild Cattle are often seen wandering, particularly on bright moonlight nights, in search, most probably, of salt, which they are so fond of licking. All the natives declare that the species found here is smaller than those monsters I saw up the Limbang and Barang. It is very likely there may be two kinds." 'Life in the Forests of the Far East' (1862), I, 283. In the narrative of his Limbang journey, the same author remarks—"Pigs [*SUS BARBATUS*] are very numerous here, and wild Cattle and Deer are also abundant." *Ibid.* II, 38. He designates them *Tambadau*, and mentions



in the hills along the Kaladyne river (which flows from the north into Akyab harbour), and thence northward through Chittagong and Tipperá, to the Khásya hills and ranges of mountains bordering the valley of Asám to the south, and along them eastward to the Mishmi hills at the head of that valley, where abundantly wild. The domestic herds are even found together with those of Yaks: thus Lt. K. Wilcox, in his memoir of a survey of Asám and the neighbouring countries (*As. Res.* XVII, 387), notices that "Mit'huns and chori-tailed cows were grazing in great numbers;" which indicates that the Gayál can withstand a considerably low temperature for a member of its particular group, that of the flat-horned taurine cattle of S. E. Asia.\*

The domestic humped cattle of Burmá are remarkably handsome animals, though with small and commonly abnormally developed horns, that are mostly directed forward. Col. Yule notices this race as one of "sturdy and well-conditioned red oxen." The prevalent colour is, indeed, a chesnut or bay of various shades, or commonly a dun, as in the cows and immature bulls of *B. SONDAICUS*. White or pale grey cattle, retaining the black tail-tuft, so very general in India, are rare, even at Akyab, where the common Bengali type prevails. Col. Yule continues—"These cattle, though much smaller than the stately breeds

an islet which is named Tambadau Island from the occurrence of these wild Cattle upon it. Elsewhere, he mentions a *piebald* individual! "About 2 A. M., our garei [boat] being well ahead, we saw before us a herd of wild Cattle, quietly picking at a few blades of grass on a broad pebbly flat. I landed with a couple of men, to get between them and the jungle. I was within twenty yards of the nearest, a piebald, and was crawling through the tangled bushes to get a sight of him, which I could hear browsing [grazing?] near me, when there arose a snort, then a rush, and the Cattle were off dashing close to me, but perfectly concealed by the matted brushwood. It was the crew of one of the newly-arrived boats that, regardless," &c. &c. "About five, we were passing down a rapid at a great pace, when one of the men touched me and pointed. I looked up, and there was a magnificent bull, three-parts grown, standing within fifteen yards of me." *Ibid.*, II, 162-3. Such cursory notices are all that are given by Mr. St. John!

Since the above note was printed, I have received a living two-year-old bull of *BOS SONDAICUS* from Col. Phayre, for presentation to the London Zoological Society. He is more nearly akin to the Gaour, and less so to the true *B. TAURUS*, than I had anticipated; and is perfectly quiet and tractable. He habitually *grazes*. Colour that permanent in the cow, a bright chesnut-dun, with the white *stockings* and oval rump-patch on each side.

\* As regards the notice by Col. Low of three presumed species of wild taurine cattle in the Malayan peninsula, and that by Dr. Helfer, of three presumed species in the Tenasserim provinces (both quoted in *J. A. S.* XXIX, 299), I have now arrived at the conviction that both writers intended *B. GAURUS* and the different sexes of *B. SONDAICUS*, the latter supposed to be distinct animals. Of the *Jungli Gau*, figured M. Fred. Cuvier, I may remark that the male undoubtedly represents a hybrid between this and the humped species; but his female would seem to be a Gayál of pure blood.

of central India and the Deccan, are considerably larger than the Bengali bullocks, and are more universally in good condition than is the case perhaps in any other country. The carts are small, and the cattle share with their masters in the exemption from everything like overwork. But probably the main reason of their good condition is, that there is no demand for milk; the calves are robbed of no part of their natural food,"\* I was much struck with the *game* appearance of these animals, which are as superior to the ordinary Bengali bullock as are the admirable Shan ponies to the wretched *tats* of Bengal (seen also at Akyab). They are longer in the body and shorter in the limbs than ordinary Indian cattle, more as in the humpless *B. TAURUS*; invariably in fine condition (as Col. Yule remarks), and particularly active and graceful in their movements, which are those of a wild animal, especially the cattle seen about the villages of the interior; and they are of Shan origin, so far as Burmá is concerned, as I am assured.

The Buffalo does not appear to be indigenous either in the Indo-Chinese or Malayan countries, though many have reverted to a state of wildness, as elsewhere. At Tavoy I first observed the superb domestic Buffaloes of Burmá, which differ in no respect from the wild animal of Bengal: they are large and plump in condition, with well developed horns. Tavoy is famous for its Buffalo fights; and I was shewn the 'champion' Buffalo, which had vanquished every competitor: he is a splendid creature of his kind, and so gentle that children fondled him. Near Tavoy I saw a large herd of albino Buffaloes, with about half a dozen of a buff colour intermingled. Stalking amidst this herd were about a dozen of *TANTALUS LEUCOCEPHALUS*, and numerous white Egrets (*HERODIAS INTERMEDIA* of my Catalogue). The leprous-looking albino breed of Buffaloes is common

\* Col. Yule adds, in a note,—“I believe the aversion to milk, as an article of food, obtains among nearly all the Indo-Chinese and Malay races, including specifically the Khásias of our eastern frontier, the Gáros and Nágas, the Burmese, the Sumatran races, and the Javanese. In China itself, it is also prevalent, as Sir John Bowring mentioned it in a letter on the population of China, published in the *Journal of the Statistical Society*. The use of milk has, however, been adopted at the Burmese Court, and the supply is furnished by some families of Kattrá Brahmans, who maintain a number of cows near the capital. But it is a foreign usage.” (*Narrative of the Mission to the Court of Ava in 1855*, p. 2. *Vide* also *J. A. S.* XXIX, 286, 302, 378). Of the natives of Kandy, likewise, Sir J. E. Tennent remarks, that—“Milk they never use, the calves enjoying it unstinted; and the prejudice is universal, that the cows would die were it otherwise disposed of.” (*Ceylon*, II, 452. 5th edition.)



also in Siam, the Malayan peninsula, and Sumátra. I saw some immense bull Buffaloes drawing hackeries near Martaban station, that would have astonished the natives of Bengal; and many others in the interior, feeding in the forest near the Karen villages, and which are oftentimes unsafe for Europeans to approach, though quite tractable to the natives to whom they are accustomed.\*

Of birds, the following new species were procured by Col. Phayre.

*GE CINULUS VIRIDIS*, nobis, *n. s.* Differs from *G. GRANTIA*, (McClelland), in being wholly of a dull green colour, more yellowish towards the nape; the rump feathers crimson-tipped: inner webs of the wing-feathers dusky, with round white spots as seen from beneath, these spots being much smaller than in *G. GRANTIA*: tail dusky above, the feathers green-edged for the basal half, and all but the middle pair having four small whitish spots bordering the basal half of their inner webs. Bill ivory-white, save laterally towards base, where livid. Feet green. The male would doubtless differ (as in *G. GRANTIA*) by having a red coronal patch. From Tounghoo.

*CRYP SIRINA CUCULLATA*, Jerdon.† Form typical, except that the

\* At Mergui, I was riding along a beautiful jungle-road, when, coming to a swamp, a herd of about thirty of these huge beasts rushed suddenly from the jungle, and made direct for me through the shallow water, menacing by tossing their heads and raising their tails and stamping with their fore-feet, when at last they came to a halt, one after another. I confess that I did not overmuch like the look of them, but still could not help admiring their noble appearance. To have run from them would have been to entice them on; so I checked my pony, not to appear alarmed, and walked quietly by in front of them, they continuing to menace all the while; after a short time I broke into a trot, and thought that I had well passed the Buffaloes, when, looking behind, I found that I was pursued by two bulls, who were already in unpleasant proximity to my nag's tail, their foot-fall producing no sound on the thinly turfed sandy road. I turned suddenly round and shouted at them, when they made off right and left, to my relief and rather to my surprise. I was afterwards necessitated to repass the same herd on my return, when half a dozen of them were fronting me in the centre of the only path, though scarcely threatening as before. I thought it best policy to ride direct towards them at a fast pace, and, when quite close to them, again shouted aloud, whereupon they at once dispersed, trotting off quietly into the swamp. A little afterwards I passed another and much larger herd of these wild-looking Buffaloes, but which took not the slightest notice of me. A native child will belabour them with a stick, and soon clear a passage through the herd. But they are not always to be trusted. When I was first at Moulmein a *must* bull tore through the main street of that town, killing one man and injuring others, and then betaking himself to the river, when the ebb-tide being at the time very strong, it was supposed that he was carried out to sea.

† This and the next species, with some others procured at Thayet-myo, have been lately described by Dr. Jerdon in *The Ibis*. My written descriptions, however, of this and one or two others, were awaiting publication for a considerable time before my friend, Dr. Jerdon, obtained his specimens. Of course I now adopt his appellations.

beak is much shorter than in *CR. VARIANS*, and there is no velvety frontal band as in the other: ten tail-feathers only; and the long middle pair expanding greatly at tip, as in *CR. VARIANS*. General colour silvery pearl-grey, with a black hood and white nape; the primaries and their coverts black, the secondaries having a whitish exterior border; middle tail-feathers black, a little tinged with greyish except on the expanded tips; the graduating lateral tail-feathers albescent-greyish, with a faint tinge of brown. Bill black, the base of both mandibles, below the nasal tuft of the upper, bright yellow in the young; and feet dusky. Length about 13 in., of which tail  $7\frac{1}{4}$  in., its penultimate feathers  $1\frac{1}{2}$  in. less: closed wing  $4\frac{1}{4}$  in.: bill to gape 1 in.; and tarse the same. Tounghoo.

The *CR. VARIANS* (also sent) is particularly common in the hills behind Moulmein; and is one of several Javanese species that likewise inhabit the Burmese region, and have not hitherto been observed in the Malayan peninsula. Another is *PLOCEUS HYPOXANTHUS*, (Daudin), a flock of which I observed in Rangoon (in addition to the common *Báyá*, the two species associating apart), and specimens were obtained by Dr. Jerdon in Thayet-myo. *CRYPsirina cucullata* is interesting, as constituting a second well-marked species of its genus, both of them being remarkable among the *Corvidous* Pies for having only ten caudal *rectrices*.

*TEMENUCHUS BURMANENSIS*, Jerdon. A fine species, approaching to *ACRIDOTHERES* in size, the markings of its wings and tail, and also in having the skin bare under and behind the eye. Length about  $9\frac{1}{2}$  in., of closed wing  $4\frac{1}{2}$  in., and tail 3 in.; bill to gape  $1\frac{1}{4}$  in.; and tarse  $1\frac{1}{4}$  in. Culmen of bill compressed and elevated above the nostrils. Head, cheeks and throat, white; the back and scapularies pure ashy; and the lower parts vinaceous, passing to white on the lower tail-coverts: wing-primaries white at base, the remainder black; secondaries and tertiaries, with their coverts, bronzed, and having a narrow black margin to each feather; underneath, the wing is white on the anterior half and dusky for the remainder; middle tail-feathers brown, and black-margined like the tertiaries, the rest black—each feather more largely white-tipped to the exterior. Bill coral-coloured, with the basal half of the lower mandible and below the nostrils black: legs and claws bright yellow. Tounghoo. Procured also at Thayet-myo by Dr. Jerdon, and at Ava by Mr. W. T. Blanford.



It is also evidently the species to which Major Tickell directed my attention, as a white-headed Maina common about Rangoon; and which he had only observed in that vicinity; but I did not chance to meet with it.\*

ANTHOCINCLA, nobis, *n. g.* A very remarkable Thrush-like *Myiotherine* (?) form, with short tail and rounded wings; the tarse moderate or somewhat short, and the toes furnished with straight claws, especially that on the hind toe. Bill as in the coarser-billed OREOCINCLÆ, with no perceptible notch to the upper mandible. No rietal *vibrissæ*. Plumage devoid of bright colours.

A. PHAYREI, nobis, *n. s.* Length about  $9\frac{1}{2}$  in., of which tail barely 2 in; closed wing 4 in., the fourth and fifth primaries longest, and the first primary measuring 2 in.: bill to gape  $1\frac{1}{2}$  in.; tarse  $1\frac{1}{8}$  in.; hind-claw  $\frac{9}{16}$  in. Colour a rich brown above, paler and more fulvous below, where each feather has a black spot on either web: middle of throat white, bordered laterally with black, and this again by a streak of black-margined fulvous-white feathers, below the brown ear-coverts; a long supercilium of feathers resembling those of the white moustache-streak, and above this again the feathers on the sides of the crown are squamate and pale-centred: primaries and their coverts black, save an angular fulvous spot at the base of the first primary; tertiaries plain brown, like the back, but the coverts of the secondaries black with broad fulvous sagittate tips. Bill dusky; and feet and claws pale. Tounghoo.

PYCNONOTUS FAMILIARIS, nobis, *n. s.* Form typical. Plumage light earthy-brown, paler beneath, less so on the breast; the lower tail-coverts a little rufescent: stems of the ear-coverts conspicuously white. Bill dusky-corneous; and legs apparently the same. Length about 8 in., of which tail  $3\frac{1}{2}$  in.; closed wing  $3\frac{1}{2}$  in.: bill to gape  $\frac{7}{8}$  in.; and tarse the same. Tounghoo. This dull-plumaged species was also procured at Thayet-myo by Dr. Jerdon, who informs me that

\* ACRIDOTHERES TRISTIS, ACR. FUSCUS, and STURNOPASTOR CONTRA, *var.*, I observed abundantly so far south as Mergui; but I know of only the second as an inhabitant of the Malayan peninsula. Tenasserim specimens of the first are dark-coloured, like those of Ceylon. At Mergui there is also the CALORNIS DAURICUS, a common Malayan species. TEMENUCHUS MALABARICUS I observed abundantly near Moulmein, and far in the interior of Martaban province. The *Pastor peguanus*, Lesson (Belanger's *Voy.*), is no other than the young of P. ROSEUS!

its habits are remarkably confiding and familiar, whence the specific name.

OSMOTRERON PHAYREI, nobis, *n. s.*: *Treron malabaricus* apud nos, *passim*. Distinguished from OSM. MALABARICUS (*verus*) by having the entire cap ash-coloured in both sexes, and the male, by having a large ochreous patch on the breast. Common in Asám, Sylhet, Arakan, Pegu, Martaban, and rare in Lower Bengal. It is the only species of the group which I observed in the forests of the Yunzalin district, Upper Martaban, where exceedingly abundant. At Moulmein I obtained the OSM. BICINCTUS, (Jerdon).

(The following kindred races have to be recognised.)

OSM. MALABARICUS, (Jerdon), *Ill. Ind. Orn.*; *Vinago aromatica* et *V. affinis*, Jerdon, *Catal.* Has the forehead whitish-grey, and no defined ash-coloured cap, though a tinge of that colour on the crown. Throat and front of neck yellow. Malabar. *N. B.* The *V. affinis*, Jerdon, seems rather to accord with the female of OSM. PHAYREI; but the latter race can hardly occur in Malabar.

OSM. FLAVOGULARIS, nobis, *J. A. S. XXVI*, 225; *Vinago aromatica* apud Selby, Jardine's *Nat. Libr.*, 'Pigeons,' p. 97; *V. aromatica* var., Jerdon, *Catal.* Distinguished by its yellow forehead as well as throat, and by having the lower tail-coverts of the male white-tipped green, as in the female, and as in both sexes of OSM. CHLOROPTERA, nobis, of the Andamán and Nicobar Islands; whereas in the other species the lower tail-coverts of the male are of a dark cinnamon-colour. Hab. Malabar and Ceylon.

OSM. POMPADOURA; *Columba pompadoura*, Gmelin. *Vide J. A. S. XXVI*, 225. Ceylon.\*

\* The other birds collected by Col. Phayre are—PALÆORNIS JAVANICUS, HÆMATORNIS CHEELA, CIRCUS MELANOLEUCUS, MICRASTUR BADIUS, ATHENE CUCULOIDES, UPUPA LONGIROSTRIS, Jerdon (rufous Burmese race), CORACIAS AFFINIS, MEROPS QUINTICOLOR, CERYLE RUDIS, MEGALAIMA LINEATA, M. INDICA, HEMICERCUS CANENTE, CHRYSOCOLAPTES SULTANEUS, TIGA INTERMEDIA, GECINUS VIRIDANUS, G. OCCIPITALIS, GRACULA INTERMEDIA, MUNIA PUNCTULARIA (the Malayan type), PASSER FLAVEOLUS, EUSPIZA AUREOLA, PARUS FLAVOCRISTATUS, SITTA CASTANEOVENTRIS, DENDROPHILA FRONTALIS, CORYDALLA RUFULA, PIPASTES AGILIS, NEMORICOLA INDICA, GARRULAX BELANGERI, G. PECTORALIS, G. MONILIGER, CHATARRHÆA GULARIS, ABRORNIS SUPERCILIARIS, REGULOIDES SUPERCILIOSUS, PHYLLOSCOPUS INDICUS, PH. AFFINIS, CAMPEPHAGA SYKESI, IRENA PUELLA, PERICROCOTUS SPECIOSUS, P. PEREGRINUS, CHIBIA HOTTENTOTA, EDOLIUS PARADISEUS, DICRURUS LONGICAUDATUS, CHAPTIA ÆNEA, ARTAMUS FUSCUS, HIRUNDA RUSTICA, TCHITREA AFFINIS, MYIAGRA AZUREA, CRYPTOLOPHA POIOCEPHALA, CRINIGER FLAVEOLUS, PYCNONOTUS HÆMORRHŌUS, P. JOCOSUS, P. MELANOCEPHALUS, PHYLLOORNIS AURIFRONS, PH. COCHINCHINENSIS, IORA



II. Col. Fytche, Commissioner of the Martaban and Tenasserim provinces, Moulmein.

The skeleton of an Andamán savage, a male of about 35 or perhaps 40 years of age, who died in the hospital of Moulmein at the time of my first visit to that station.\* Finding that there was no hope of his recovery, I requested Col. Fytche to direct that his bones should be prepared for the Society's museum; but as I was just leaving at the time, I was unable to superintend the preservation of them. I regret now to find that the skeleton is very imperfect; too much so, in fact, to be set up. Of the vertebral column, the *axis* and one of the lumbar vertebræ are missing, also several of the ribs, and most of the small bones of the hands and feet. Of the teeth, the two medial and the left lateral upper incisors have been lost, also the first upper right præ-molar, the left lower canine and all the lower incisors, though one or more of these last may have been lost during life, as were the last upper true molars right and left, the *alveoli* of which have quite disappeared. As usual among savage races, the molars are ground evenly flat, or very nearly so. The skull is essentially of the Indo-Germanic type, very similar to some Hindu skulls, and exhibiting no tendency to the negro peculiarities. The parietal bones are rather broad and posteriorly flat; and the *glabella* (or inter-orbital space) is somewhat wide. The general character thus conforms to my observations of the living men, as embodied in Col. Fytche's notice of them, *J. A. S. XXX*, 364, *et seq.*; and at the time of making those remarks, I may observe that I had not seen Prof. Owen's notice of the skeleton of an Andamáner read before the British Association in 1861. The left *zygoma* of the individual had been fractured, but the bone had re-united, with a considerable bend inward occupying the anterior half of the arch.

Col. Fytche has also favoured us with the skull of a Rhinoceros, shot by Dr. Hook of Tavoy near Tavoy Point, where there is a small isolated colony of the species. I refer it to the narrow type of RII. SONDAICUS.

(To be continued.)

TYPHIA, ORIOLOUS MELANOCEPHALUS, O. TENUIROSTRIS, DICEUM CRUENTATUM, NECTARINIA ASIATICA, N. PHÆNICOTIS, CARPOPHAGA SYLVATICA, TURTUR TIGRINUS, T. HUMILIS, FRANCOLINUS PHAYREI, TURNIX OCELLATUS, SARCOGRAMMA ATROGULARIS (the Burmese and Malayan type, which I procured so high as at Akyab, distinguished from the Indian by having the neck largely black all round, set off below by a white border), CHARADRIUS PHILIPPINUS, GALLINAGO STENURA, and STERNA JAVANICA.

\* The individual known as 'Punch Blair,' vide *J. A. S. XXX*, 259.











A-5

# JOURNAL

OF THE

## ASIATIC SOCIETY.

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No. IV. 1862.
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*Report on a Route from the mouth of the Pakchan to Krau and thence across the Isthmus of Krau to the Gulf of Siam.—By Captain ALEXANDER FRASER, Bengal Engineers, and Captain J. G. FORLONG, Ex. Engineer T. and M. Provinces.*

—

*From Captain A. FRASER, Bengal Engineers.*

*To Lieutenant-Colonel A. FYTCHE, Commissioner M. & T. Provinces, Tavoy, 26th April, 1861.*

Sir,—I have the honor to forward to you the enclosed Report, with plans, &c. as per margin, of a journey made by Captain Forlong and myself up the Pakchan river, and across the Isthmus of Krau to the gulf of Siam.

1. Sketch map and Survey of route from mouth of Pakchan *via* Krau to Tayong on the gulf of Siam, in two sheets.

2. Survey of the river Pakchan from its mouth, in the Mergui Archipelago to above Krau.

3. General Sketch map of steam routes in Bay of Bengal and China sea.

4. Tables I. to IV. of Comparative cost of do.

No one can be better aware than yourself of the good which would accrue to the Provinces of Pegu and Tenasserim, by the free importation of Chinese labour, by the route recommended, and we therefore submit this Report to you. As, fur-

ther, the matter involves other, and far more important than local interests, we recommend that the Report be forwarded to the Government of India, as one worthy of immediate and attentive consideration, with such remarks as your complete knowledge of the general and local bearings of the subject may deem expedient.

We would beg to bring to your notice the great civility and kindness with which we were received by the chief civil authority, Taeompa, in the Siamese territory.

I have, &c.,

(Signed) A. FRASER, *Captain, Bengal Engineers.*

1. The Steamer "Nemesis," with Lt.-Col. A. Fythe, Commissioner T. & M. Provinces on board, anchored about 15 miles up the river Pakchan in five or six fathoms of water. Banks, steep and densely wooded, with a stream running between them of (here) about a mile in breadth.

2. Opening into the Mergui archipelago, opposite the south end of St. Mathew's Island, there are some six fathoms of water at low water over the Bar at the mouth, though vessels coming from the north, inside the Island, have to run some little way southerly to avoid an extensive spit of sand, which runs partly across the entrance to the river.

3. On the north side, the right or British Bank, of the stream, are the tin mines of Malewoon, which are, we believe, workable to any extent to which money and labour are procurable. On the other side are the tin mines of Rahnong worked by the *Siamese* Government.

4. Collecting, on the evening of the 31st March, all the instruments necessary for a rough survey, a Perambulator, Compass, and Aneroid, we left the steamer in a native boat with a flood tide, and proceeded up this river which forms the boundary between the British possessions in these Provinces, and the *Siamese* territories. A fog came on, and we were obliged to anchor for some time. We arrived, however, at Krau by 4 P. M. of the 1st April.

5. Krau is a Shan village of some fifty houses with a few Chinese inhabitants. The civil authority was absent attending his superior at *Tsoompeon* the chief place of the district, and where a Woondouk, a functionary equal in authority to our Dy. Commissioner, resided.

6. At Krau we rested the night in a good zayat, which had been prepared for the aforesaid chief civil authority, who visits periodically his district on this, the Western side of his Majesty of Bankok's Southern dominions. We had some difficulty in procuring means of locomotion in consequence of there being no one to give



orders upon our wishes, but just as we were starting the next morning, (2nd April) with some four or five coolies we had managed to procure, an elephant made its appearance, and we were enabled to proceed a little more comfortably than we had anticipated.

7. We commenced on the 2nd April a route survey across a country which we believe is quite unknown to, and has never been traversed by Europeans. There is a good level cleared road for the first two miles, and to the third mile it rises and passes along the right bank of the Krau river. The forest on each side contained bamboos and trees, as mentioned in the plan. Up to a little short of the 8th mile, the road follows the course of the Krau river, and is difficult,—we had to wade for a mile through the stream, which was not, however, more than ankle deep, but falling every now and then over rocks, with banks about twenty or thirty feet high, and forty feet apart; at this time, the rain commenced and fell with little intermission till we returned to Krau.

8. At the 8th mile, we arrived at the water-shed of the country, a small grassy plain. The Krau river runs hence west to join the Pakehan at Krau; and a quarter of a mile further on, a river called the Bankren, joining the *Tsoompeon* at Tasan ( $1\frac{1}{2}$  miles) flows to the gulf of Siam on the east.

9. At *Tasan* is another zayat similar to that at Krau, with a few houses and dry cultivation. We continued to cross and re-cross the *Tsoompeon* river to the 10th mile. At  $15\frac{1}{2}$  miles, after crossing tributaries of small breadth, but with steep banks, we got again to the *Tsoompeon*, where it was some 200 feet wide, but of little depth. The jungle remained of the same character, and the nature of the country, as the path descended to the plains passing through low but steep hills, was very similar to that in the ascent from Krau to Tasan.

10. At  $17\frac{1}{2}$  miles we got to *Apay*, another zayat, and were glad to rest for the night, for, in addition to the walking over very rough ground and for miles through the rivers, wet throughout, the rain had brought out the leeches, which attacked us most unmercifully. The first indication of their attacks was finding our trowsers covered with blood; our last resource was to tie the trowsers round the ankles so as to prevent them getting inside, but even then, unless some one was looking after us while engaged in taking angles or reading the

Perambulator, if we stood still for any time we found them lodge in our necks. The amount of blood these creatures take from one, before becoming aware of it, is really exhausting, and it is therefore desirable to warn others.

11. The night was fine, the rain was reserved till day light for our special benefit: crossed a tolerably sized (80 feet) river just beyond Apay, and another at the 20th mile, a tributary of the *Tsoompeon*. We came to the end of the Hills at the 22nd mile, and entered upon a fine open country, with patches of jungle and garden and paddy lands, capable of any amount of cultivation.

At the 22nd mile, the Hills stretched away to the southward, and seemed to run east, parallel with our course, about a mile and a half to the northward, and, as we fancied, along the left bank of the *Tsoompeon* river.

At the 23rd and 25th miles, crossed another river of 120 feet in breadth, the margin of which was much cultivated, and we continued along (about half a mile from) the left bank of this river, which seems to be the *Pah-Klong* joining the *Tsoompeon* near its mouth, to the 29th mile, after which, at a distance of thirty miles from Krau, we re-crossed the *Tsoompeon* where it is about 200 feet broad, and arrived at the residence of the chief civil authority of this district, who received us most kindly at about noon of the 3rd April.

12. *Tsoompeon* is a large place of some four or five hundred houses, with a water communication of twenty miles with the gulf of Siam. We thought of continuing our journey down the stream the same day, but the heavy rain that fell was even more persuasive than the kind and polite old Governor who, as soon as we had made up our minds to remain till next morning, placed every thing that weary travellers could require at our disposal, and ordered boats to be in readiness for us at 2 A. M. (4th April) when the ebb made. There is a rise and fall of tide here of about 6 feet.

13. Started at 2 A. M. of the 4th April, and proceeded down a very winding stream to the mouth of the river opening in to the gulf of Siam, where we arrived at 5½ A. M. or in about 3½ hours having the tide with us. Here we landed and found a fine villa, in some disrepair; this was said to be the King's residence when he came to this part of his dominions. His steamers were said



to come in two days from Bangkok, and fuel (billets of wood) in quantities (about 20,000 pieces) was collected. There was a schooner of about 150 tons lying off the shore at about 50 yards distance in 5 fathoms of water, but there is a bar, above where the schooner lay, across the mouth of the river *Tsoompeon*, with only  $1\frac{1}{2}$  fathoms over it at low water. There would be no difficulty in making wharves for large ships, and, so far as we could observe, there would be no difficulty in making roads from *Tsoompeon* to this place. We found store-houses here with a couple of 32 Pr. Carronades belonging, we supposed, to the King's steamers, though we asked no questions about them. From the general appearance of the buildings, &c., we think it is a place not open to severe storms or heavy sea. This is confirmed by an extract from Commander Richards' "Gulf of Siam," taken from the Bangkok Calendar, stating that "Heavy gales are unknown in the gulf." With a view of establishing a communication across the Isthmus of Krau, it would be necessary, accurately to determine several points which would render such communication practicable with reference to the gulf of Siam, as we had ascertained in regard to our own side; this the time and commissariat at our disposal prevented us doing satisfactorily and we did not wish to exhibit a curiosity by asking too many questions which might have proved offensive to a friendly power. We made the distance from *Tsoompeon* to the sea shore 21 miles, making the total distance from Krau to the shore of the gulf about 50 miles.

14. At  $7\frac{1}{2}$  p. m. 4th April we returned to *Tsoompeon*, surveying the river roughly; we passed *Tayoung* about 4 miles from the mouth a short distance up a creek which here falls into the *Tsoompeon*, we were told that two vessels of some 200 tons were loading there. *Tayoung* is large, said to consist of some 200 houses, we had not time to land, as we wished to get back to *Apay* this night.

15. We arrived at *Tsoompeon* at  $10\frac{1}{2}$  a. m. and after much civility, which we hereby acknowledge, from *Payar Teet* the Governor, who provided us with two more elephants, we started on our return through heavy rain. Slept at *Apay* this night (4th April). Got to Krau the next day, 5th at 4 p. m., passing through the streams which had swollen a little from the heavy rain, the commencement of the monsoon. Went straight on board our boat, tested the cor-

rectness of the survey of the Pakehan (hereto annexed) said to have been executed by an Officer of the "Ganges" Steamer, which some fifteen years ago, was employed in conveying Captain Durand on an expedition up this river to settle a boundary question. Anchored for the night; arrived next day at noon on board the "Nemesis."

15½. On the route from Krau to Tsoompeon we were struck with a remarkable change of geological features. We had observed, as we emerged on the plains of *Tsoompeon*, very marked looking abrupt hills, which, being accustomed to such in the limestone Islands of the Mergui Archipelago, we concluded were of the same group, but on closer examination they turned out to be sedimentary rocks of either the secondary or primary series, Captain Forlong inclines to think the latter, and to be closely allied to the old red sandstone group, the dip was N. E. by N. We were unable to collect specimens worthy of being forwarded. All the Islands of the gulf, that we could see, seemed of the same formation, worn into smooth rounded tops, but with perpendicular sides, some of the layers were as fine as thread, although generally half an inch thick,\* all abounded in pebbles, and what Captain Forlong believes to be minute fossils. The rocks across the pass were mostly a quartzose sandstone.

16. It seemed, from our survey of the route, so manifest that a communication might be established with little comparative expense across this narrow neck of land, thus connecting the Bay of Bengal with the China sea by a route which would avoid the long, dangerous, and circuitous passage by the Straits of Malacca, that we thought it worth while to enter into a few calculations by which might be shown in figures the comparative advantages of the two routes. The following is the result, one which, to our minds, makes a further examination of the Isthmus of Krau worthy of immediate consideration by our Government in communication with that of Siam, as likely to prove of advantage to each, and of enormous value to commerce and the travelling world in general. It would relieve the commercial world to a great extent of the enormous steam charges which keep up the prices of the goods which form the staples of trade between Europe, India and China, and which render travelling almost prohibited, and it would open up a new and interesting country to the geologist and the botanist,

[\* *Sic ex conject.* The copy received has ½ "thick. Eds.]



and introduce a hardy and hard-working population (the Chinese) into provinces which contain mineral wealth in known and unknown quantities; wealth, which merely requires labour to develop to any extent, and in search of which the Chinese even now find their weary way, but who would then come in large numbers, especially as the new treaty allows them to emigrate with their families. Much and valuable information regarding the great mineral wealth of these provinces may be found in some interesting papers by Colonel Tremenheere, Bengal Engineers, and Professors Helfer and Oldham.

17. The Tables annexed I. II. & III. show the economy of fuel, establishment, and time, which would be arrived at by establishing easy communication across the Isthmus. A canal we consider out of the question. *A railroad is not only quite practicable, but likely to cost less per mile than any other in India.*

|                                                                                                                                                                                                                                                                                                                                              |     |        |   |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|---|---|
| 1st. Table I. exhibits the costs of the present line of steamers per month, without taking into consideration the expenses of idle vessels, or any incidental expenses whatever, merely the cost of fuel and establishment per trip, for running steamers, as kept up by the P. and O. Company from Ceylon viâ Singapore to Hong-kong, ..... | Rs. | 39,700 | 0 | 0 |
| Table II. the cost of ditto, (kept up we believe by Messrs. Apcar & Co.) direct from Calcutta to Hong-kong viâ Singapore, .....                                                                                                                                                                                                              |     | 40,200 | 0 | 0 |
| Table III. the ditto, of ditto, kept up by C. & B. S. N. Company from Calcutta to Maulmein viâ Akyab and Rangoon,.....                                                                                                                                                                                                                       |     | 11,900 | 0 | 0 |
| Total Cost of present arrangement per month, .....                                                                                                                                                                                                                                                                                           |     | 91,800 | 0 | 0 |
| 2nd. Table I. shows again the cost of a line running from Ceylon to Krau and from Gulf of Siam (Tayoung) to Hong-kong, .....                                                                                                                                                                                                                 | Rs. | 32,900 | 0 | 0 |
| Table II. the cost of a line from Calcutta viâ Akyab, Rangoon, Maulmein, Tavoy, Mergui and Siam and thence per China-line to Hong-kong, .....                                                                                                                                                                                                |     | 17,300 | 0 | 0 |
| Total cost of two lines which would answer all the purposes of the present three lines, .....                                                                                                                                                                                                                                                |     | 50,200 | 0 | 0 |

3rd. The saving therefore which would be derived by commerce and the travelling world, by establishing a communication across the Isthmus of Krau (provided it be quick and efficient,) by the mere calculation of saving of fuel and establishment of running steamers, will be represented by the sum of Rs.  $(91,800 - 50,200) = 41,600$  per mensem, or Rupees 499,200 per annum which sum at 5 per cent. would give a capital of 100 lakhs, or one million sterling.

4th. The Tables do not show, however, the vast further saving which would accrue, by running *two* lines of steamers instead of *three* in the Bay of Bengal, and *one* line instead of *two* on the China side of the Siamese and Malay Peninsula; the reduction of the number of steamers, the saving thereby of steamers lying idle while not running, the concentration of coal depôts, and many other incidental expenses which of course increase according to the number of lines running.

5th. The Tables again do not show what a vastly more profitable undertaking it would be to run one *through line* from Calcutta viâ Akyab, and Rangoon to the Pakchan, and thence to China, instead of one with a terminus inland at Maulmein getting no traffic as compared with that which would open up to the *through line*, and another line direct from Calcutta to China, only touching at the Straits' Settlements.

6th. The 12 millions trade (if positive, but which is probably only a transit trade) of Singapore, Malacca and Penang, and the  $14\frac{1}{4}$  millions of Netherlands-India, could easily command a steamer of its own, to run alternately on either side of the Malayan Peninsula, communicating with Krau on the one side for the Bay of Bengal, and Tayoung on the gulf of Siam, on the other, for China and Europe, as shown by dotted green lines on the general sketch map. It may occur to some, that the cost of this steamer should be deducted from the saving calculated in the 3rd clause. We think not, but there is much more than sufficient for it; and we may place this cost against that of the other private steamers, between Calcutta and Hong-kong viâ Singapore, not included in our calculations.

7th. From Point de Galle to the five-fathom anchorage in the Pakchan river, and from Tayoung, in the gulf of Siam to Hong-kong, Table I. shows to be 281 hours' steam (more or less does not matter



for calculation, as the same rate of steaming is taken for all) while the route viâ Singapore is shown to be 337 hours' steam. We calculate, as hereafter shown, that the passage across the Isthmus of Krau would not ordinarily occupy more than twelve hours, with a liberal allowance of time.

We have therefore a difference of time in favour of the Krau route [337 + 12 | 281 + 12] 56 hours. This is of much importance when we hold in view the costly nature of the produce and goods conveyed. It has also long been a desideratum to have a weekly communication with England, but the immense cost of putting on four steamers per month from Calcutta to Aden has hitherto, we suppose, deterred the P. & O. Company as they would thereby obtain no extra trade.

But supposing the communication through Krau established, the extra trade that would be brought by the extension of the line of P. & O. Co.'s vessels to Krau, would pay for an extra steamer between Point de Galle and Aden, by means of which by making it meet the Bombay mail at Aden by bi-monthly steamers from Ceylon viâ Krau, the communication between England and Calcutta would be weekly; twice per month by the P. & O. Co.'s line viâ Point de Galle and Madras, and twice by the vessels viâ Krau to Calcutta, thus providing for the whole of the Eastern Coast of the Bay of Bengal viâ Krau, as the P. & O. Co. does for its western Coast viâ Madras. The time from Ceylon to Calcutta viâ Krau (by the direct steamer as hereafter mentioned) would be as follows.

|                       |     |     |     |     |            |
|-----------------------|-----|-----|-----|-----|------------|
| Ceylon to Krau, ...   | ... | ... | ... | ... | 126 hours. |
| Krau to Calcutta, ... | ... | ... | ... | ... | 102 „      |
|                       |     |     |     |     | <hr/>      |
| Or 9½ days,...        | ... | ... | ... | ... | 228        |
|                       |     |     |     |     | <hr/>      |

Nearly as quick as the route viâ Madras.

8th. By Table II. including 3 hours' stoppage at Akyab, 12 at Rangoon, 12 at Maulmein, 3 at Tavoy (Mamoogan) without going up the river, and 3 at Mergui, (the trade of the two latter places being about 5 lakhs), the number of hours between Calcutta and Krau by those places is shown to be (143 + 33) 176, while the further progress to China from Tayoung would be about 153 hours, or with 12 hours across the Isthmus of Krau, a total distance

of  $(143 + 33 + 12 + 153)$  341 hours. The direct line of China steamers touching at Singapore would probably delay, ordinarily 6 hours at Penang and 12 at Singapore,—this added to the steam distance gives 360 hours, making a difference in point of time in favour of the Krau route, viâ Akyab, of 19 hours, while the latter picks up all the trade. The valuable goods (opium especially) and the mail from England might be sent by a single steamer running twice a month to and from Calcutta to Krau. The cost of this steamer is shown in Table IV. and the capital for construction of railroad would be reduced to £700,000, much more than sufficient, however. This arrangement of running a steamer direct to Krau from Calcutta would beat the direct line to China viâ Singapore, by 93 hours as follows:—

|                             |     |     |     |             |
|-----------------------------|-----|-----|-----|-------------|
| From Calcutta to Krau,      | ... | ... | ... | 102 hours.  |
| From Krau to Tayoung,       | ... | ... | ... | 12 „        |
| „ Tayoung to Hong-kong,     | ... | ... | ... | 153         |
|                             |     |     |     | —           |
|                             |     |     |     | Total—267   |
|                             |     |     |     | —           |
| From Calcutta to Singapore, | ... | ... | ... | 179 „       |
| Stoppages,                  | ... | ... | ... | 18 „        |
| Hong-kong,                  | ... | ... | ... | 163 „       |
|                             |     |     |     | —           |
| Difference, 93 hours,       | ... | ... | ... | Total—360 „ |
|                             |     |     |     | —           |

and would give a regular weekly communication with Calcutta as shown in last para. while the line running viâ Akyab gives to the eastern coast of the Bay of Bengal all the advantages of early communication with home, which its western coast enjoys viâ Madras. But the steamers viâ Akyab, should not have to go up the Rangoon and Maulmein rivers, by which means other 12 hours would be saved, making a total saving, even after touching at all the four posts (for Mergui would probably be moved to the Pakchan) of  $(19 + 3 + 12)$  34 hours over the Singapore line. Elephant Point and Amherst Point should be the respective posts of call, for Rangoon and Maulmein, with telegraphic communication between those places and the capitals of Pegu, and the Martaban and Tenasserim provinces.



9th. All the trade between Maulmein and the Straits, for which there is no better mode of carriage than junks and kattoos, and all the tin found on both sides of the Pakchan, in the Lenya river, and indeed all along the coast up to Yeh, and which only requires capital and labour to develop to any extent, would be picked up at Krau, while the labour for the tin mines of the Pakchan, and possibly for the coal mines of Mergui, could be imported direct from China. All the  $1\frac{1}{2}$  millions of the Bangkok trade and that of the Malayan Peninsula, on the eastern and western side, would be intercepted at Tayoung and Krau, also all adjuncts, which none of the present lines of steamers obtain, but which would go far to make them pay. Between Maulmein and Krau, where the coast is profusely wooded, wood-fuel might be used to increase profits, or decrease expenses, should it take any time to develop the trade carried on between Maulmein and Singapore. The cost of burning wood on this coast, as compared with that of coal, is as 1 to 10, taking the wood as 10 Rs. per 1000 billets, and coal at 25 Rs. 4 ans. per ton, and assuming that 250 billets 4 feet long, by 4 inches diameter, equal one hour's steam, or one ton of coal.

18. It would answer no useful purpose, to go into all the figures necessary to establish even an approximate idea of the greater profit that would be assured to commerce and to Steam Companies, by adopting the new lines herein proposed instead of the present lines. It was only necessary to take three items, fuel, establishment, and *time of actual running steamers*, to prove our position, and if we can show, that by the saving of the two first of these items, we can establish communication across the Isthmus of Krau, which shall also beat all present lines in point of the third, and most valuable item, *time*, we think it unnecessary to examine into the contingent saving which, to any one who will give intelligent consideration to them, will manifestly appear enormous.

19. In the 3rd clause of the 17th para. we have shown the saving in fuel and establishment, of *running steamers*, to be 5 lakhs per annum, representing *a capital of one million sterling*. Can the communication by Krau be established within this sum? If so, all the contingent savings and gain in time, go to the profit of trade, as well as any difference between the cost of the said communication, and the keeping of it up. Our consideration of the subject of the

communication across the Isthmus of Krau has brought us to the following conclusions.

1st. That there should be two or three tug steamers with long flat-bottomed boats to carry goods and passengers from the five-fathom anchorage of the large steamers, 26 miles up the river Pakchan, as shown in the sketch map of the Isthmus, by the dotted green line, in which distance the river is nowhere less than one fathom at dead low water spring tides. There is a rise and fall of 8 feet. Time three hours' towing.

2nd. At this point (see plan) opposite Namoy river, a railway terminus and hotel, whence a railway will proceed, (leaving Krau to the north) by Tasan, to Tsoompeon on the shore of the gulf of Siam, distance fifty miles. Time three hours.

3rd. Allow other six hours for discharging in the Pakchan, and loading at Tayoung on the Siam side, (where there should be another railway terminus and hotel) total time twelve hours, which is more than that required by the P. & O. Co. at Suez, on whose arrangements we will suggest further improvements.

4th. There need be only one station in the centre of the line where the rail should be double on either side, for the distance of about one mile, to allow of trains passing, the remainder of the line may be single as the Suez line.

5th. The boats of eight or ten tons for the river service, should form the bodies of the carriages for the railroad service, patent slips being formed at the Krau terminus and if necessary also on the gulf of Siam shore, up which the loaded boats may be dragged on their own wheels, which could form the slip cradles, and the boats could be tacked on to the engine and proceed to the other side without any delay. The arrangement of the boats for goods and passengers is a matter of detail easily managed. There is no reason why a carriage should not be in the form of a boat, especially when time is saved in loading and expense in rolling stock. These boats would be at the anchorage, ready for the steamers as they come in from the mouth, when loaded, would be towed up to the railway terminus, dragged up the slips, and taken off at once per rail to Tayoung, where there should be a wharf for the China steamers, to lie along side, if there be water enough, if not, the carriage should be launched at once on to the sea, and sent to the steamers.



6th. We would here observe again, that our survey was rough, that we merely passed along the native line (which is well defined, but in many places in the beds of rivers) with perambulator, compass and aneroid, that our aneroid showed no height above the sea of more than seventy-five feet, and that our route presented no obstacle of engineering difficulty, beyond dips to nullahs, ordinarily twenty or thirty feet wide, with some three or four rivers from one to two hundred feet wide. A careful survey would be necessary.

7th. We would, however, recommend very little masonry, though lime and fuel for bricks are in abundance, but the vast and inexhaustible forests, through which the line passes, are full of timber suitable for sleepers, for bridges, for stations and wharfs and for fuel for the locomotives, all that would be required from England would be plant, permanent-way, and rolling stock, the labour for the work being procurable from China to any amount.

8th. We will double, what in our own, somewhat experienced minds, would be the cost of such a railroad across the Isthmus, and put down the amount at £5000 per mile, including stations, wharfs, hotels, coal-sheds, &c., &c. and rolling stock for fifty miles of rail £250,000. For the river service three tug steamers with all the advantages of disconnecting engines, towing with a single hawser &c. which the Thames tugs possess, at £15,000 each equal to, .....

|                                                 |          |
|-------------------------------------------------|----------|
| .....                                           | £ 45,000 |
| 12 Coal Barges @ £800, .....                    | 9,600    |
| Rolling Stock 50 miles, .....                   | 250,000  |
| Contingencies at 50 per cent. including Buoying |          |
| River, .....                                    | 27,300   |

---

Total £331,900

or say 1-3rd of a million sterling. But there is the interest on a *capital of one million of money, saved every year in fuel, and establishment of running steamers alone*; surely it must be worth while the expending such a capital, in establishing this communication.

20. We therefore think, that without reference to the dangerous navigation, the Straits line should be abandoned as a communication between India and Europe, and China; as the old Cape of Good Hope line was abandoned for the Suez line. Considering, however, the

difficulties of the Straits navigation, and peculiarity of the China Sea, the steamers would probably do all the work, and beat sailing vessels off the field, which they cannot do now, because the present charges upon steamers are so heavy ; this will be modified by adopting the Krau route.

21. The extra service required to give a weekly mail to Calcutta, by a single extra steamer running twice a month between Aden and Point de Galle, might be well undertaken by the P. and O. Company, as well as the whole service (by a lower class of steamers however on the China side than is at present employed) between Ceylon and Krau, and gulf of Siam and Hong-kong. The Companies running the direct lines of steamer, between Calcutta and Hong-kong viâ Singapore, and the line between Calcutta viâ Akyab, &c., and Maulmein, might advantageously to themselves and to the public amalgamate, and run one steamer twice a month direct to Krau, to meet the China and Europe steamers returning direct to Calcutta ; two from Calcutta viâ Akyab, Rangoon, and Maulmein to Krau, returning viâ those posts. The railway should be a separate Company, and there should be a condition in their contract which would scarcely require a guarantee to that effect.

22. With these arrangements carried out, we may incidentally mention, that the telegraph, instead of being submarine from Rangoon should be carried along the coast from Maulmein, with a junction with the railway telegraph at Krau, and also a *junction* with the Rangoon and Tongoo telegraph at Sittang, thus giving another line of telegraph communication with Calcutta, by which English news, and China news, may be transmitted from Krau.

23. The arrangement which might be made with the Government of Siam, for the grant of land &c. has not formed a subject for our discussion, as with the present liberal-minded, and far-seeing monarch on the throne of Bangkok, to whom the advantages which must result to himself and his people, by carrying out this project, will be at once obvious, we see no difficulty on this point.

24. We have thus laboured to prove, and we think have done so satisfactorily that *as a mere speculation*, the construction of a railway across the Isthmus of Krau, will be profitable ; that the communication may be established for a third of the capital, the interest of which is now being expended yearly *on mere fuel and*



*establishment of running steamers*, and that a vast amount of time will be saved over present routes. Of the political bearing of the subject, we have said nothing, but holding in view that the line from Ceylon to Cochin China, is nearly straight, we are convinced that if Great Britain does not take it in hand, France must, with every chance of a profitable opposition to the P. and O. Company in their line with Europe to Calcutta viâ Madras.

ALEX. FRASER,

*Captain, Bengal Engineers.*

J. G. FORLONG,

*Captain F. R. S E.*

*Ex. Engineer, Tenasserim Provinces.*

Table of Great Sea Routes from Ceylon to China and Calcutta and vice versâ. See Report on the communication by the Isthmus of Krau by Captains Fraser and Forlong.

Dated Tavoy, the 26th April, 1861.

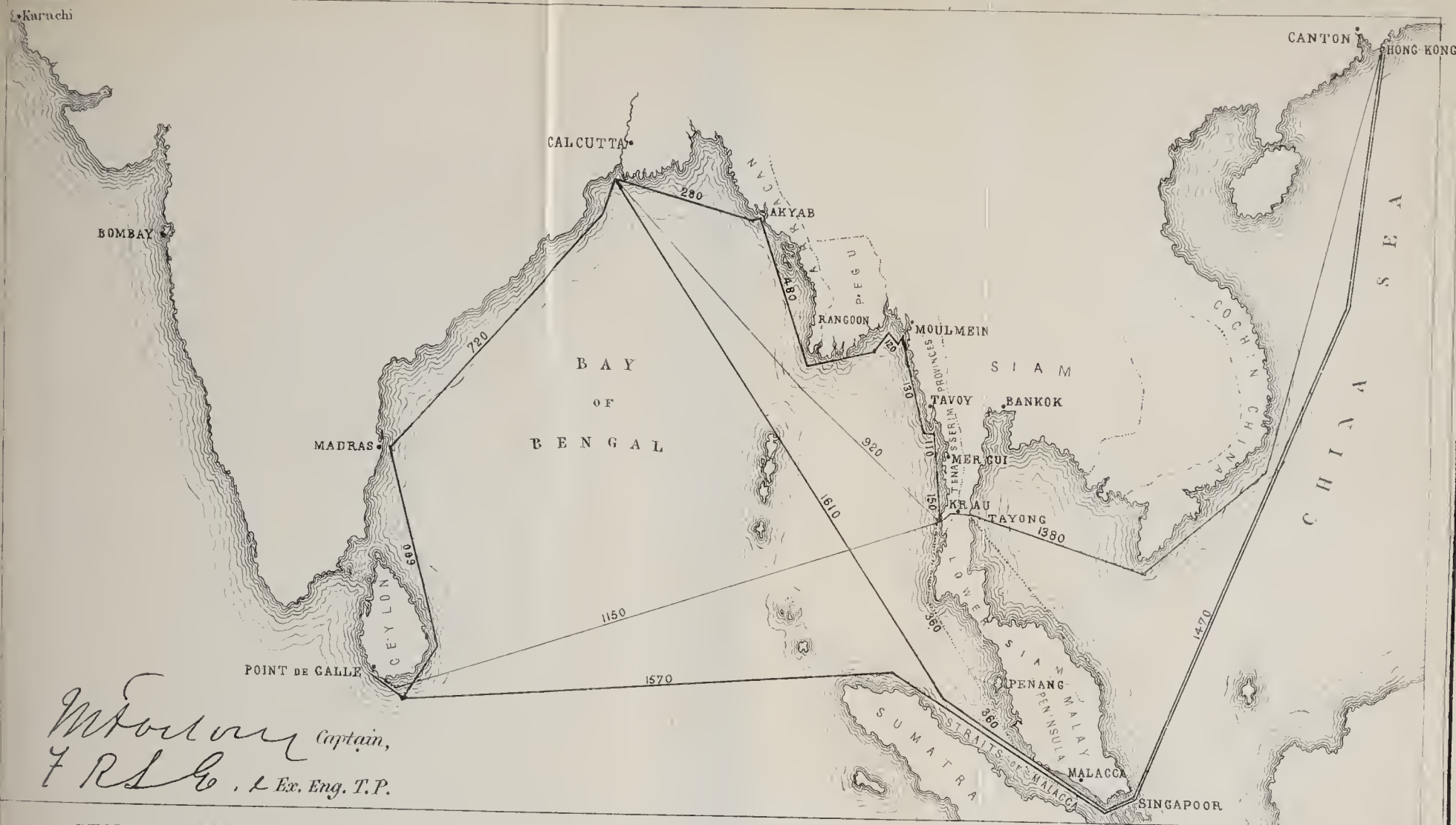
| Tables.                                                                                        | Routes two Steamers starting per month on all Lines.                             | Distance in Miles.                   |        |          |           |        |         |       | No. of Hours. Steam. | No. of Tons coal Burnt. | Cost of Fuel. | Cost of establishment. | Total cost of steamer per Trip. | Cost of 4 trips per month. | Saving.    |        |              |
|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------------------------------------|--------|----------|-----------|--------|---------|-------|----------------------|-------------------------|---------------|------------------------|---------------------------------|----------------------------|------------|--------|--------------|
|                                                                                                |                                                                                  | Singapore.                           | Akyab. | Rangoon. | Maulmein. | Tavoy. | Mergui. | Krau. |                      |                         |               |                        |                                 |                            | Hong-kong. | Total. | Rupees. | Time per Trip. |
| I.                                                                                             | { Ceylon viâ Singapore to Hong-kong,.....<br>Ceylon viâ Krau to Hong-kong, ..... | 1570                                 | ...    | ...      | ...       | ...    | ...     | ...   | 1470                 | 3040                    | 337           | 337                    | 8425                            | 1500                       | 9925       | 39,700 | ...          |
|                                                                                                |                                                                                  | ...                                  | ...    | ...      | ...       | ...    | ...     | 1150  | 1380                 | 2530                    | 281           | 281                    | 7025                            | 1200                       | 8225       | 32,900 | 6800         |
|                                                                                                |                                                                                  | 1610                                 | ...    | ...      | ...       | ...    | ...     | ...   | 1470                 | 3080                    | 342           | 342                    | 8550                            | 1500                       | 10,050     | 40,200 | ...          |
| II.                                                                                            | { Calcutta viâ Akyab, Rangoon. Maulmein, Tavoy, Mergui and Krau, .....           | ...                                  | 280    | 480      | 120       | 150    | 110     | 150   | ...                  | 1290                    | 143           | 143                    | 3575                            | 750                        | 4325       | 17,300 | 22,900       |
|                                                                                                |                                                                                  | ...                                  | 280    | 480      | 120       | ...    | ...     | ...   | ...                  | 880                     | 98            | 98                     | 2450                            | 525                        | 2975       | 11,900 | 11,900       |
| III.                                                                                           | { Calcutta viâ Akyab and Rangoon to Maulmein,.....                               | Total saving per Month, Rupees,..... |        |          |           |        |         |       |                      |                         |               |                        |                                 |                            |            |        | A            |
|                                                                                                |                                                                                  |                                      |        |          |           |        |         |       |                      |                         |               |                        |                                 |                            |            |        | 41,600<br>12 |
| IV.                                                                                            | { Calcutta to Krau direct, one Steamer twice per month,                          | ...                                  | ...    | ...      | ...       | ...    | ...     | 920   | ...                  | 920                     | 102           | 102                    | 2550                            | 450                        | 3000       | 12,000 | 5,00,000     |
|                                                                                                |                                                                                  | ...                                  | ...    | ...      | ...       | ...    | ...     | ...   | ...                  | ...                     | ...           | ...                    | ...                             | ...                        | ...        | ...    | 29,600       |
|                                                                                                |                                                                                  | ...                                  | ...    | ...      | ...       | ...    | ...     | ...   | ...                  | ...                     | ...           | ...                    | ...                             | ...                        | ...        | ...    | 3,50,000     |
| Saving per annum after deduction of Cost of above line from saving A. See 8th clause para. 19. |                                                                                  |                                      |        |          |           |        |         |       |                      |                         |               |                        |                                 |                            |            |        |              |

\* By leaving out Mergui, and establishing communication between Rangoon and Elephant Point, and Amherst and Maulmein, the saving of 19 hours may be increased to 34 hours, see 8th clause 17th Para. of Report.

(Signed) ALEX. FRASER, Bengal Engineer.  
(Signed) J. G. FORLONG, Ex. Engineer T. & M. P.



TO ACCOMPANY REPORT BY CAPTAINS FRASER & FORLONG, DATED 26<sup>TH</sup> APRIL, 1861. TAVOY



*Forlong* Captain,  
*F R L G* . L. Ex. Eng. T.P.

**GENERAL MAP**

Showing advantages obtainable by Establishing communication at **KRAU**. The Thick lines delineate existing Routes. The Thin those proposed. It will be manifest that the **two** Thin lines from Point-de-Galle, and Calcutta to Krau, producing the existing line from Moulmein to **KRAU**, will more than provide for all the work done by the **three** Thick lines, from Ceylon to Singapore, Calcutta to Singapore, and Calcutta to Moulmein, by shorter Routes, (see Tables,) while, on the other side the **SINGLE** Thin line from **KRAU**, does the work of the **DOUBLE** Thick lines from Singapore to Hong-kong.

**56 HOURS** are saved by the adoption of the Thin line Rout via **KRAU** from Ceylon to Hong-kong.

**93 HOURS** will be saved between Calcutta and Hong-kong by the adoption of the direct Thin line via **KRAU**.

**34 HOURS** will be gained by the production of the Thick line from Calcutta via Akyab to Krau, and its continuation to Hong-kong, over the present **DIRECT** line, via Singapore. By the Thin line from Ceylon to **KRAU**, and thence direct to Calcutta, two extra **ENGLISH MAILS** may be carried in  $9\frac{1}{2}$  days to the mouth of the Hoogly, necessitating only **ONE** extra Steamer between Ceylon and Aden, to meet the Bombay Mail.

Singapore will become a place of no importance except as the centre of Trade of Nether-lands-India. Should this be sufficient to command steam communication, the Route for India and Europe will be by the dotted line to **KRAU**, and for China, by the dotted line to Tayong.





*A Further Note on Wild Asses, and alleged Wild Horses.*

—By E. BLYTH.

1. *The Wild Ass of the African Zahára.*

At the time that my paper ‘On the Different Animals known as Wild Asses,’ (Vol. XXVIII. 229,) was submitted to the public, I had seen no detailed description of an undoubted African wild Ass, though (for reasons assigned) I claimed it as the veritable *ASINUS ONAGER*, as distinguished from sundry kindred specific races that had been a good deal confounded. This animal has, of late, been received both in the Paris *Jardin des Plantes*, and in the London Zoological Gardens; though, still, no particular notice of it would appear to have been yet published, shewing its distinctive characters, upon comparison, with the *HEMIPPUS*, *HEMIONUS*, &c.; nor have we been made acquainted with those that are alleged to justify the discrimination of the *Kyang* from the *Ghor-khur*. In a very interesting work\* that I have lately seen, however, I find a description of the wild Ass of the African Zahára, which, I think, worthy of citing, and thus bringing more prominently to notice; and, especially, as it indicates the existence of at least a second African species, as the *Hamar* or *Ahmar* of Sudan; which latter is, doubtless, that which Dr. Barth considered to be identical in species with Mr. R. Schlagintweit’s Indian *Ghor-khur*. I may further notice, that, in Kraff’s Travels, &c., in E. Africa (p. 277), “wild Asses” are mentioned as being “plentiful in Kayo” (about 5° N. lat.)

Mr. Tristram writes, that, while his companion “set off with his sketch-book, I returned to see a very fine Ass which had been brought, for inspection, and was valued at thirty dollars. Having heard that wild Asses were to be occasionally found in the Soufa desert, on the route to Ghadames, I had made every enquiry after one; fully believing that I should see the Koomrah (*Equus hippagrus*, Jardine,)† mentioned by Dr. Shaw, and known to inhabit some of the sparsely wooded hills of the Fezzan country.

“My surprise, therefore, was great on seeing a veritable ‘Onager’ or wild Ass, of what exact species I cannot state. He certainly approached, very near, the *ASINUS ONAGER* of Asia [meaning the *Ghor-khur*, or *E. asinus onager* of Pallas and the younger Gmelin‡],

\* *The Great Sahára: Wanderings South of the Atlas mountains.* By H. B. Tristram, M. A., F. Z. S., &c. (1860), p. 318.

† *Potius* C. Hamilton Smith, in Jardine’s *Nat. Libr.*—E. B.

‡ *Asinus indicus*, Selater.

and possessed all the marks which distinguished this species from the *Hamar* or *Ahmar* of Sudan[!]. He stood about two hands higher than a common Ass [the race found in England is doubtless meant\*] was very strong-limbed, of a rich slatish ash-colour, with the stripe running from the mane to the tail, and the cross-stripe on the shoulder; his coat very sleek and short [the summer vesture]. His nose and limbs were white; and the lower part of the neck, and between the shoulders, whitish; the mane and tail blackish; with ears broad; and I think, perhaps, longer than in the common Ass: square-built and powerful; with a keen, lively eye; and teeth ready to seize the first opportunity for a snap at any by-stander. He trotted with great speed, and cantered easily. He had been caught when very young, and was considered unusually tame for one of his species; but still he was capricious and unmanageable, and required a tremendous bit to hold him.

“These Asses form valuable beasts of burthen, from their power of sustaining a three-days’ march without water; but the adults are very difficult to entrap and impossible to train. The natives say that they are not gregarious [?], but consort regularly with the Ostrich, and have a keen sight and still keener scent. I have since regretted that I did not make some effort to bring this animal to England; because, I feel persuaded, that it differs, as a variety, if not as a species, from any hitherto seen in our Zoological Gardens.”

Of a rich *slatish ash-colour*, with the humeral as well as the dorsal stripe well developed! Surely the true aboriginal Donkey, as I contended before; and, from a brief description which I have received from the present talented Secretary of the Zoological Society, P. L. Sclater, Esq., I should say identical in race with another African (Nubian?) specimen, received some time ago in that Society’s menagerie: only the latter has limb-stripes, also, which is not stated of Mr. Tristram’s animal; though this is of no importance whatever, except that the African Onager’s limb-stripes would seem to be those commonly seen in domestic Asses; whereas the limb-markings of the *Ghor-khur* (when it shews them), are altogether different, consisting of narrow and close wavy and sometimes reticulating cross-lines chiefly at the joints, and of a light fawn-colour; those of the true

\* The late Don Carlos had an Ass in his stud-house at Aranjuez, in 1832, that exceeded fifteen hands in height. *Vide* the Hon’ble Richard Ford’s *Gatherings in Spain* (1846), p. 72.



Donkey being broader, much wider apart, and black. None of the kindred races is stated, ever, to be of a slaty hue; though it now appears that both *Ghor-khur* and *Kyang* are subject to variation of colour; and, in India, the puny domestic Asses of the country exhibit precisely the same range of colouring as the Camel. A *pied* Ass is what I have never heard of. Here, the reported 'wild Ass' of the N. E. Shan States, noticed in p. 169 *antea*, may again be referred to.\*

## 2. *The alleged Wild Horses of Mongolia.*

In the late Mr. T. Witlam Atkinson's 'Travels in the Regions of the Upper and Lower Amoor,' &c. (2nd edit., 1861), the Appendix consists of a series of highly interesting lists of the mammalia, birds, and ordinary plants, respectively of the valley of the Amoor (divided into Upper, Middle, and Lower), of the Kirghiz steppe, Kara-taw, Ala-taw, and Tarbagatai, and of the trans-Baikal and Siberia.† *EQUUS HEMIONUS* is mentioned, as an inhabitant only of the upper Amoor territory; and *EQUUS CABALLUS sylvestris*, only in the grand last-mentioned region: but the description (in p. 325) most assuredly denotes a *feral* as distinguished from an aboriginally wild race of Horse, or rather of *Pony*, analogous to that of true wild Ass in Africa. With the wild *ASINI* (of different specific races), some variation of shade of colour undoubtedly does occur, as before remarked; but is exceptional. No aboriginally wild mammal is known that varies ordinarily so much in hue, as would seem to be implied by Mr. Atkinson's description of the alleged wild Horses of Mongolia.

"This animal is not like the wild [or rather feral] Horse of South America, which undoubtedly sprung from those taken into the country by the Spaniards. He is of a distinct race from the Asiatic Horse [which, of among so very many Asiatic races? At all events, he, too, is Asiatic;] very small (not so large as an Ass), beautiful in form, having a small head and short ears, and varying in colour from black, bay, grey, and white, the latter being the most rare. He is called 'Muss' by the Kirghis. His sense of smell is very acute, which renders him most difficult to approach, and few Horses can run him down." The author incidentally mentions that these animals are found, in great herds (about May), near the foot of the mountains beyond the river

\* I have recently observed several domestic Asses, of a very dark colour, but having no trace of the cross.

† From Dr. Leopold von Schrenk. *Vide Natural History Review*, Jan. 1861, p. 13.

Ili; and describes the mode of hunting them, which is to chase a herd into a narrow mountain-pass, secured on the other side, so that the poor animals run into a trap, and are there cruelly butchered with battle-axes; for "the Khirghiz consider their flesh the greatest delicacy the steppe affords."

I am disposed to consider that the herds, referred to, have about as much claim to be considered as aboriginally wild, as have the New Forest Ponies in England,—neither less nor more,—or, as the feral cattle of Chillingham Park, with their likewise very suspicious colouring; the latter, too, being artificially maintained by weeding out all calves that deviate in hue. I do not think that the *EQUUS CABALLUS* has, anywhere, so good a claim to be regarded as aboriginally wild, at the present day, as have the One-humped Camels noticed by Rüppell, as abounding in the long stretch of desert between the valley of the Nile and the Red Sea; but, it is to be regretted that M. Rüppell does not mention the colouring of these animals, whether, or not, subject to much variation. A large proportion of the domestic Camels of vast tracts of the African continent are white; and a prevalence of white individuals would be highly suspicious, in the herds which M. Rüppell considers as feral; but which may yet be truly as aboriginally wild as are the African wild Asses, which, also, by the way, were considered as feral by the late Prince of Canino. It must be a rare circumstance, indeed, for a Camel, left to perish by the Arabs and others, to recover; though, still, Camels may have strayed from domesticity. Should the wild herds not vary much in colour, I see no reason why they might not be regarded as probably aboriginal.\*

\* When I noticed what I termed the decimation of the wild herds of Elephants in Borneo (in p. 197 *antea*.) it should have been remarked, that, if the *tusk*ers only were killed, it would no more affect the multiplication of the race, than does the withdrawal by emasculation of so many males of our common domestic animals. *Pro tanto*, therefore, the decimation argument goes for nothing.

The Mogul Emperor Báber mentions, incidentally, the occurrence of the Rhinoceros, the wild Buffalo, and the Lion, in the neighbourhood of Benáres; and wild Elephants in the vicinity of Chunâr! When nearly approaching Benáres, he states—"At the station, a man said that in an island close on the edge of the camp, he had seen a Lion and a Rhinoceros. Next morning we drew a ring round the ground; we also brought Elephants to be in readiness, but no Lion nor Rhinoceros was roused. On the edge of the circle one wild Buffalo was started \*\*\*. In the jungle around Chunâr, there are many Elephants." (p. 407). Elsewhere, he asserts that the Elephant "inhabits the district of Kalpi; and the higher you advance from thence towards the East, the more do the wild Elephants increase in number. That is the tract where the Elephant is chiefly taken. There may be thirty or forty villages in Karrah and Manikpûr that are occupied solely in this employment of taking Elephants." Upon which, the translator justly remarks, in a note penned about half a century ago, that—"The improvement of Hindustân,





Feet

SPHARGIS CORIACEA

DRAWN ON STONE & LITH: BY H. M. SMITH. S. G. O. CALCUTTA, NOV: 1862.





*Order Chelonia.*—By S. R. TICKELL, ESQ.

*Maulmein, March 8th, 1862.*

*To the Secretary of the Asiatic Society, Calcutta.*

DEAR SIR,—I have the pleasure to send to the museum of the Society a specimen, as well prepared as circumstances permitted, of a rare and little described species of Turtle, of which I beg to annex the following description, which may perhaps be considered worthy of publication in the Journal of the Society.

Your's obediently,

S. R. TICKELL.

Family. Thalassidæ.

Genus. Sphargis (Merrem).

Synonyms. Corinda (Fleming).

Dermatochelys (Blainville).

Species. Coriacea? (Auctorum).

"The Trunk Turtle" (apud Bell).

The specimen herewith forwarded to the Society is a female. She was captured, February 1st, 1862, near the mouth of the Yé river (in the Tenasserim Provinces), on the sandy beach of which she had

since Báber's time, must be prodigious. The wild Elephant is now confined to the forests under Hemâla, and to the Ghâts of Malabar. A wild Elephant near Karrah (Currah), Manikpûr, or Kalpi, is a thing, at the present day, totally unknown. May not their familiar existence, in these countries, down to Báber's days, be considered as rather hostile to the accounts given of the superabundant population of Hindustân in remote times?"—I have now reliable information of the unexpected fact of a two-horned Rhinoceros having been killed in Asâm! where it is undoubtedly exceedingly rare. I was told this by a friend, whose informant (when in the province) had seen the two horns attached to the skin; but I cannot at present obtain further details.—As regards the reported existence of a one-horned Rhinoceros in Africa (*vide* p. 153 *antea*), Dr. Livingstone incidentally remarks—and I cite the whole passage because of its interest—that "Sportsmen have still some work before them in the way of discovering the fauna of Africa. This country abounds in game; and beyond Berotse, the herds of large animals surpass anything I ever saw [elsewhere], Eilands and Buffalos, their tameness was shocking to me: 81 Buffalos defiled slowly before our fire one evening, and Lions were impudent enough to roar at us. On the south of the Choba, where Bushmen abound, they are very seldom heard; these brave fellows teach them better manners. My boatmen informed me that he had seen an animal, with long wide-spreading horns like an Ox, called *Liombikalela*; also another animal, which does not live in the water, but snorts like a Hippopotamus, and is like that animal in size—it has a horn, and may be a one-horned Rhinoceros. And we passed some holes of a third animal, which burrows from the river inland, has short horns, and feeds only by night. I did not notice the burrows at the time of passing, but I give you the report as I got it. Sable Antelopes abound, and so does the Nakong; and there is a pretty little Antelope on the Sesheki, called *Teeanyane*, which seemed new to me. These animals did not lie in my line, so you must be content with this brief notice." (*Journal of the Royal Geographical Society*, Vol. XXIV, 700.) A horned burrowing animal is not very likely to exist.

deposited about a hundred eggs, when she was surprised by a number of Burmese fishermen, who had been lying in ambush near the spot (a favourite resort of the common Turtle, *Chelonia virgata*), and, after a desperate struggle, was secured.

The strength, aided of course by the enormous weight, of the animal, was such, that she dragged six men endeavouring to stop her, down the slope of the beach, almost into the sea, when she was overpowered by increased numbers, lashed to some strong poles, and brought into the village by ten to twelve men at a time.

Being desirous of taking an accurate drawing of the Turtle, I was puzzled for some time how to induce her to sit for her portrait, as she was very restless, and, in her endeavours to scramble away, upset any moderate number of people that tried to stop her. At last, I had her slung with slings, as they hoist a water-butt on board a ship, from the branch of a tree, and then, with a guy or tripping line, from the tree to the caudal extremity of her shell, to prevent her slewing round, she hung quite motionless.

The description, in Dumeril and Bibron, of *Sphargis coriacea* is so minute and accurate, and applicable to the present specimen, that it would be mere repetition, were I to add, here, the notes which I took of the animal. I will merely mention the points in which it differs from the details given by the above authors. The principal one of which is the *colour*; due allowance being made for the specimens described in the Paris Museum d'Histoire Naturelle, having been more or less faded.

The colour of the animal, now under notice, while still alive, and fresh from the sea, was a plain blackish neutral tint, extending all over the carapax, crown, nucha, upper half of tail, and outer face of the paddles. The whole being dabbed over with white spots, of irregular shape, like little patches of white-wash. The seven tuberculous longitudinal ridges of the carapax were also whitish. All of the under-parts, including the sternal and abdominal shields, and the inner sides of the paddles, pale flesh-colour, blotched and spotted with pale blackish neutral, which, on the sternum, take the form of three longitudinal bands on each side of the mesial suture, with irregular edges and spotted intervals. The white spots, on the head, have a fleshy tinge. Throat reddish flesh-colour, marbled pale blackish; iris burnt umbre-brown.

Dumeril and Bibron's adult subject is described, as having the carapax "un brun marron" which, I should translate, as "castaneous-



brown" with pale yellowish patches ; and the lower parts brown, as well as the head and neck.

The specimen, under review, was sufficiently aged to have lost all traces of plates or shields on the head, which was tolerably smooth, and apparently covered with a plain tight coriaceous skin, loosened into folds and wrinkles on the throat and neck, like that on the trunk of an Elephant. The paddles were covered with similar hard stretched leather. The fore-paddles had, on the extremities of the middle and little fingers, a triangular flat nail, the spaces answering to the ends of the index and ring-fingers being marked with a cucullate sharpish edge of the skin. On the hind-paddle, the innermost or little toe will be found strongly relieved from the contour of the rest of the foot, and covered by a broad triangular scale or nail. These features will, doubtless, be apparent in the dry skin, and are particularly noted here, as Dumeril and Bibron deny the existence of any nails or scale extremities to either fore or hind digits.

The carinæ, or longitudinal ridges of the carapax, are not serrated ("faiblement dentelées en scie,") as in Dumeril and Bibron's subject, but are composed of lines of large, rough, and partly worn tubercles. No traces of plates are visible on either sternum or carapax, which are covered, as with hardened untanned leather apparently, continuous with the integuments of the neck and limbs. There are no traces of ridges or tubercles on the ventral aspect of the body ; but the mesial line is marked by a slight depression.

The dimensions of the animal taken, rather roughly, by me, were as follow :

|                                                 |                      |                       |
|-------------------------------------------------|----------------------|-----------------------|
| Entire length from upper lip to end of carapax, | 6' 2 $\frac{1}{2}$ " | (straight).           |
| Length of head,.....                            | 1' 0 $\frac{3}{8}$ " | } Over the<br>curves. |
| neck, .....                                     | 7 $\frac{3}{8}$ "    |                       |
| carapax, .....                                  | 5' 6 $\frac{3}{4}$ " |                       |
| Fore paddle, .....                              | 3' 3 $\frac{1}{2}$ " |                       |
| Hind ditto,.....                                | 2' 2 $\frac{1}{2}$ " |                       |
| Breadth of carapax, .....                       | 2' 6 $\frac{1}{4}$ " |                       |
| Depth of body, .....                            | 2'                   |                       |

Its weight I had not the means of ascertaining : but it required six men to lift it fairly off the ground ; and Taloung fishermen are not a particularly feeble race.

The eggs were spherical, of 1 $\frac{5}{8}$ " diameter, and are as palatable as

those of the river Tortoise are nauseous. Besides those, the animal had laid in the sand, there, must have been upwards of a thousand in her ovaria, in all stages of maturity. The flesh was dark and coarse and very few of the crowds of Burmans assembled at Yé to see the animal would eat any of it. For the eggs there was a popular ferment.

According to my fishing friends, in that part of the country, this Turtle, which they called simply လိပ်ကြီး (*Lykgyee*, or 'large Turtle,') is of exceedingly rare occurrence. The few that have been seen were on the shores of the numerous islands along the coast. This was the first one they had ever found on the main-land. Cantor does not mention it in his catalogue of the *Chelonia* in the Malayan seas, nor does Jerdon in his list of those of the Indian peninsula. Dumeril and Bibron remark that it is very rare, and found in the Mediterranean and Atlantic Ocean. One is mentioned by Rondelet, captured at Frontignan, seven cubits long (!). Two more specimens are recorded as having been taken off the coast of France; and Borlase mentions one netted on the Cornwall coast in 1756, of which he has given, says Dumeril, "une mauvaise figure."

The only illustration, that I have seen of this animal is in Bell's British Reptiles. It is of a young one, and is copied from a plate in the "Fauna Italica" of the Prince of Musignano. Never having seen a young specimen, I cannot speak of the faithfulness or otherwise of the drawing.

*Sphargis coriacea* is stated, by Audubon, to resort to the Turtle islands of Florida, for the purpose of depositing its eggs. The average number laid by it may be 350; and it is less cautious than the common Turtle in performing this function. "Its food consists of mollusca, fish, crustacea, sea-urchins, and various marine plants," (Bell's *Reptilia*, p. 14). As far as my experience goes, the food of all *Chelonia* (excepting the *Potamidæ*) is purely vegetable.

Bell adds, that of two specimens of this Turtle taken, off Cornwall, in 1756, the larger weighed 800 lb., the smaller nearly 700. Another was caught on the coast of Dorsetshire, and is now, it is conjectured, the individual in the British Museum. An instance is related by Pennant, of the flesh of this animal causing serious illness to a person who had partaken of it, producing "dreadful vomiting and purging." Those who ate the individual now described, at Yé, experienced nothing of the kind.

S. R. TICKELL.



*The Chárváka System of Philosophy.*—By E. B. COWELL, M. A.

Colebrooke (Essays, Vol. I. p. 402) states that “for want of an opportunity of consulting an original treatise on this branch of philosophy or any connected summary furnished even by an adversary of opinions professed by the Chárvákas,” he was unable to give any sufficient account of their peculiar doctrine further than that it is undisguised materialism. The system is continually alluded to in different philosophical treatises, but it is only by the recent publication, in our Society’s Bibliotheca, of Mádhaváchárya’s Sarva-dars’ana-sangraha, that the want which Colebrooke regretted has in any way been supplied. Among the fourteen systems there analysed, that of the Chárvákas holds the first place; it being entitled to that priority in consequence of its being the most degraded of all,—the next places to it being successively occupied by those of the Bauddhas and the Jainas.

A translation of this chapter appeared in the fourteenth Vol. of the Zeitschrift der Morgenlandischen Gesellschaft, but unfortunately it abounds with errors of every description, that it can convey no proper idea of the original. In fact one might almost doubt whether such a book as the Sarvadars’ana-sangraha could be properly translated in Europe. Even here it is difficult to understand it in the absence of any commentary, even with all the assistance at one’s command of pandits thoroughly versed in the ancient philosophies of their ancestors; and there are many parts of the volume, which the most learned pandits of Bengal confess their inability to explain.\*

The doctrines of the Chárvákas are frequently confounded with those of the Bauddhas and Jainas, but Mádhava’s summary, as well as still more authentic notices from the sects themselves, proves that this is erroneous. Chárváka is sometimes taken as the name of a leader of the sect, and sometimes as a generic title,—in the Mahábhárata mention is made of a rákshasa of that name, who endeavours by a false report of Bhíma’s death to ruin the Páṇḍavas in the moment of their final triumph. Most accounts, however, ascribe the founding of the sect to Brihaspati. We might have more natur-

\* The present chapter is one of the easiest in the work, but there are several passages in it which I could not have translated, but for the aid of Pandit Mohesh Chandra Nyáyaratna.

ally expected, that the doctrines in question would have been attributed to S'ukra, the preceptor of the demons, rather than to Bṛihaspati, the preceptor of the gods; and plausible grounds for such an adjudication might have been found in the singular passage at the end of the Chhándogya Upanishad. There we read, that Indra among the gods and Virochana among the Asuras or demons, went to Prajápati to learn the knowledge of the Soul, and that Virochana acquiesced without further inquiry in the exoteric doctrine of the Self. "He, Virochana, with a feeling of satisfaction, repaired to the Asuras, and unto them imparted this instruction, 'Self alone is adorable; in this world Self alone should be served; by adoring and serving one's self, both this and the other world may be attained.' Therefore thenceforward the Asuras give no alms, have no faith in good works, and officiate at no sacrifice; hence are they called Asuras. This is their Upanishad. Their dead are besmeared with aromatics and adorned with ornaments and costly raiment, and they think that thereby they will overcome this region and that." Tradition, however, gives a different origin; and just as Vishnu is said to have assumed his ninth avatár as Buddha to destroy the daityas, so Bṛihaspati is described as promulgating his system to overthrow the pre-eminence of the sons of Ráji.

The legend is given with more or less detail in the Vishnu and Matsya Puránas.\* I subjoin the following abridgement of it from the Harivansa (chapter 28).

A'yus, the son of Purúravas of the lunar dynasty, had five sons, Nahusha, Vṛiddhas'arman, Rambha, Ráji and Anenas, of whom Ráji had five hundred sons. A great war was going on between the devas and asuras, and Brahmá had foretold victory to that side which was espoused by Ráji. The two parties claim his aid,† but on his demanding to be made an Indra as his reward, the demons refused, saying, "Our Indra is Prahráda." The gods on the other hand accept the proposed condition, and Ráji accordingly conquers their enemies and becomes during his lifetime their Indra. On Ráji's death, his 500 sons seize the inheritance, and Indra is unable to prevail against them. In the extremity of his distress he is repre-

\* The latter makes Bṛihaspati teach the Jaina doctrine.

† Ráji was descended by his father from Soma, but by his mother from Swarbhánu, a dánava.



sented as going to Brihaspati and begging for a piece of the sacred Puroḍás'a though it were only the size of a jujube fruit, to support his fainting strength, just as Aristophanes represents the gods coming to Peisthetærus when the walls of Nephelococcygia interrupted the smoke of the sacrifices. Brihaspati in compassion promises to aid him in recovering his lost dominion, and for this purpose he invented a new system of atheistical doctrines, "A practical S'ástra of atheism, utterly hostile to religion, most subtle of logical systems, and beguiling the hearts of the wicked, though such as could never please the mind of the truly virtuous." This new S'ástra of Brihaspati easily deluded the minds of the young princes, and they soon lost all their merit and fell from their 'pride of place,' and Indra regained his throne.

The earliest mention which I have found of the word *Nástika* (nihilist,) or its derivatives is in the Maitráyaní Upanishad (3rd book, § 5) where *Nástikya* is enumerated as one of the effects of the quality of darkness.\* *Nástika* and *Nástikya* occur several times in Manu. In the Rámáyana we have an allusion to *nástikas* in ch. 109 (Schlegel's ed), of the Ayodhyá Káṇḍa, where Ráma censures Jábáli for advising him to break his father's vow and return to his capital.

"I blame that deed of my father that he chose as his priest one so unstable-minded as thee,—wandering to ruin with such opinions, a very atheist (*Nástika*) astray from the path of religion.

"As is the thief, so too is the Bauddha; and know that the *Nástika* is equal to them. Therefore the sage whom men most hold in awe, will not speak face to face with the *Nástika*.†"

We find *Nástika* as well as *ástika* in the Purohitagana attached to Páṇini's grammar. I have already mentioned that Chárváka ap-

\* Buddhist, or materialist, opinions seem alluded to in such passages as Chhándogya Upanishad, VI. 2, 1, &c.

† There is a variation in Schlegel's text and that of the late Calcutta edition. The former has तस्माद्भि यः शक्यतमः प्रजानां; the latter has शक्यतमः, and the Schol. explains the S'loka thus;

बुद्धो बुद्धमतानुसारो तथा चोरवद् दण्ड इति प्रसिद्धं नास्तिकं चार्वाकं तथागतं तत्सदृशं चोरवद् दण्डं विद्धि। नास्तिकविशेषस्तथागतः तमपि चोरवद् दण्डमिति शेष इत्यन्ये। वेदप्रामाण्यापहर्तृत्वेन तेषामपि चोरत्वात्। हि निश्चयेन तस्मात् प्रजानामनुग्रहाय राज्ञा चोरवदेव दण्डयितुं शक्यतमो यः स चोरवदेव दण्डः दण्डयोग्ये तु बुधो ब्राह्मणे नास्तिकेऽभिमुखो न स्यात् तत्सम्भाषणादि न कुर्वीतेत्यर्थः। तुल्यन्यायात् दण्डसमर्थो ब्राह्मणेऽपि तद्विमुखः स्यादिति सूचितं।

pears as a demon in the Mahábhárata, and he is there described as killed by the curses of some Bráhmans of Yudhishthira's party.

Some authorities say that Brihaspati taught his doctrines to his disciple Chárváka, but if we may judge by the occasional quotations, the so-called Brihaspati-s'ástra must have been from ancient times the text-book of the sect. No copy is now known to exist,\* but we have quite enough extant in the form of quotations to enable us to judge of the character of the work. Its author, like Lucretius among the Romans or Omar Khayyám among the Persians, was strong to overthrow,—he could ridicule the absurdities of superstition, but he was blind to the religious instincts which underlie them,—and hence they are, all alike, men

—when faith had fall'n asleep,  
Who heard a voice 'believe no more,'  
And heard an ever-breaking shore  
That tumbled in the godless deep.

Of course if we look at these blind gropings of bewildered humanity simply in themselves, they can have nothing to teach or even interest us; but it is not so, if we consider them in relation to the history of the human mind. The Chárváka doctrines, and in fact, all such purely negative systems, may be regarded from three separate points of view, and it is as seen under these several aspects that they present such widely varying characters. If we only look at them so far as they deny the deepest instincts of our nature, we can but turn from them in disgust and horror,—the belief in God and in the soul's immortality are not the results of logical inference, but the very postulates of human thought, and we deny our own humanity if we choose to question them. Again, so far as these sceptical systems only uttered a protest against the superstitions of their age, we may regard them not only with pity but with mournful interest. But so far as they express the negative side of philosophy, they may even claim our most serious attention, for they help us to remember those natural limitations and defects of the human mind, which we are so apt to forget in the excitement of new discoveries. Are they not in fact

\* Since writing this paper we have received the third part of Vol. XIX. of the Royal Asiatic Society's Journal, which contains a paper by Mr. Muir on the fragments of Brihaspati as compared with similar passages in the Rámáyana and Vishnu Purána. He there states that Dr. Hall had in vain searched for any copy of these Bárhaspatya S'lokas. We may well despair of their being ever found, if even the discoverer of the Bháratíya S'ástra has failed to find any trace.



the necessary shadow that the human mind flings as it advances,—the slave set to warn the conqueror in the triumphal procession?

We now proceed to give a literal translation of Mádhava's account of the system from the *Sarva-dars'ana Sangraha*.

*The Chárváka doctrine.*

We have said in our preliminary invocation "salutation to S'iva, the abode of eternal knowledge, the storehouse of supreme felicity," but how can we attribute to the Divine Being the giving of supreme felicity, when such a notion has been utterly abolished by Chárváka, the crest-gem of the atheistical school, the follower of the doctrine of Bṛihaspati? The efforts of Chárváka are indeed hard to be eradicated, for the majority of living beings hold by the current refrain,

While life is yours, live joyously,  
None can escape Death's searching eye;  
When once this frame of ours they burn,  
How shall we e'er again return?

The mass of men, in accordance with the S'ástras of policy and enjoyment\* considering wealth and desire the only ends of man, and denying the existence of any thing belonging to a future world, are found to follow only the doctrine of Chárváka. Hence another name for that school is Lokáyata,—a name well accordant with the thing signified.†

In this school the four elements, earth, &c., are the original principles,—from these alone when transformed into the body, intelligence is produced, just as the inebriating power is developed from the mixing of certain ingredients,‡ and when these are destroyed, intelligence at once perishes also. They quote the S'ruti for this (*Bṛihad Áraṇy. Up. II. 4. 12.*), "springing forth from these elements, itself solid knowledge, it is destroyed when they are destroyed,—after death no

\* See Dr. Hall's preface to the *Vásavadattá*, p. 11.

† "S'ankara, Bháskara, and other commentators name the Lokáyatikas, and these appear to be a branch of the Seet of Chárváka" (Colebrooke). Lokáyata may be etymologically analysed as 'prevalent in the world' (*loka*, and *áyata*). *Laukáyatika* occurs in Páṇini's *ukthagaṇa*.

‡ *Kinwa* is explained as "a drug or seed used to produce fermentation in the manufacture of spirits from sugar, bassia, &c." Colebrooke quotes from S'ankara: "The faculty of thought results from a modification of the aggregate elements in like manner as sugar with a ferment and other ingredients becomes an inebriating liquor; and as betel, areca, lime and extract of catechu chewed together, have an exhilarating property not found in those substances severally."

intelligence remains.”\* Therefore the soul is only the body distinguished by the attribute of intelligence, since there is no evidence for any soul distinct from the body, as such cannot be proved, since this school holds that perception is the only source of knowledge and does not allow inference, &c.

The only end of man is enjoyment produced by sensual pleasures. Nor may you say that such cannot be called the end of man as they are always mixed with some kind of pain,—because it is our wisdom to enjoy the pure pleasure as far as we can, and to avoid the pain which inevitably accompanies it; just as the man who desires fish, takes the fish with their scales and bones, and having taken as many as he wants, desists; or just as the man who desires rice, takes the rice, straw and all, and having taken as much as he wants, desists. It is not therefore for us, through a fear of pain, to reject the pleasure which our nature instinctively recognises as congenial. Men do not refrain from sowing rice, because forsooth there are wild animals to devour it; nor do they refuse to set the cooking-pots on the fire, because forsooth there are beggars to pester us for a share of the contents. If any one were so timid as to forsake a visible pleasure, he would indeed be foolish like a beast, as has been said by the poet,

The pleasure which arises to men from contact with sensible objects

Is to be relinquished as accompanied by pain,—such is the reasoning of fools;

The berries of paddy, rich with the finest white grains,

What man, seeking his true interest, would fling away, because covered with husk and dust?†

If you object, that, if there be no such thing as happiness in a future world, then how will men of experienced wisdom engage in the agnihotra and other sacrifices, which can only be performed with great expenditure of money and bodily fatigue?—your objection cannot be accepted as any proof to the contrary, since the agnihotra, &c., are only useful as means of livelihood, for the Veda is tainted by the three faults of untruth, self-contradiction and tautology;‡ then

\* Of course S’ankara, in his commentary, gives a very different interpretation, applying it to the cessation of individual existence when the knowledge of the Supreme is once attained. Cf. S’abara’s Comm. Jaimini Sút. i. i. 5.

† I take कण as here equal to कूंड.—Cf. Atharva V. xi. 3, 5. अश्वः कणा गाव-  
सण्डुला मशकास्तुषाः.

‡ See Nyáya Sútras, II. 57.



again, the impostors who call themselves Vaidic pundits are mutually destructive, as the authority of the jñána-kāṇḍa is overthrown by those who maintain that of the karma-kāṇḍa, while those who maintain the authority of the jñána-kāṇḍa reject that of the karma-kāṇḍa; and lastly the three Vedas themselves are only the incoherent rhapsodies of knaves, and to this effect runs the popular saying,\*

The Agnihotra, the three Vedas, the ascetic's three staves, and smearing oneself with ashes,—

Bṛihaspati says, these are but means of livelihood for those who have no manliness nor sense.

Hence it follows that there is no other hell than mundane pain produced by purely mundane causes, as thorns, &c.; the only Supreme is the earthly monarch whose existence is proved by actual perception; and the only Liberation is the dissolution of the body. By holding the doctrine that the soul is identical with the body, such phrases as 'I am thin,' 'I am black,' &c. are at once intelligible, as the attributes of thinness, &c. and intelligence will reside in the same subject (the body); and the use of the phrase 'my body' is elliptical, like 'the head of Ráhu' (Ráhu being really *all head*).

All this has been thus summed up,

In this school there are four elements, earth, water, fire and air;

And from these four elements alone is intelligence produced,—

Just like the intoxicating power from kiṇwa, &c. mixed together;

Since in 'I am fat,' 'I am lean,' these attributes abide in the same subject,

And since fatness, &c. reside only in the body,† it alone is the soul and no other,

And such phrases as 'my body' are only significant by ellipsis.

"Be it so," says the opponent, "your wish would be gained, if inference, &c. had no force of proof; but then they have this force; else, if they had not, then how on perceiving smoke, should the thoughts of the intelligent immediately proceed to fire; or why, on hearing another say 'there are fruits on the bank of the river,' do those who desire fruit proceed at once to the shore?"

All this, however, is only the inflation of the world of fancy.

Those who maintain the authority of inference accept the *sign*, or middle term, as the causer of knowledge, which middle term must

\* The word *ábhánaka*, which occurs several times in the S. D. S. (e. g. p. 107), is not found in any lexicon. The Pandits explain it by *kimvadaní*.

† I read देहे for देहः.

be found in the minor and be itself invariably connected with the major.\* Now this invariable connection must be a relation destitute of any condition, accepted or disputed ;† and this connection does not possess its power of causing inference by virtue of its *existence*, as the eye, &c. are the cause of perception, but by virtue of its being *known*. What then is the means of this connection's being known?

We will first shew that it is not *perception*. Now perception is held to be of two kinds, external and internal, *i. e.* as produced by the external senses, or by the inner sense, mind. The former is not the required means ; for although it is possible that the actual contact of the senses and the object will produce the knowledge of the particular object thus brought in contact, yet as there can never be such contact in the case of the past or the future, the universal proposition‡ which was to embrace the invariable connection of the middle and major terms in every case, becomes impossible to be known. Nor may you maintain that this knowledge of the universal proposition has the general class as its object, because, if so, there might arise a doubt as to the existence of the invariable connection in this particular case,§ (as, for instance, in this particular smoke as implying fire).

Nor is internal perception the means, since you cannot establish that the mind has any power to act independently towards an external object, since all allow that it is dependent on the external senses, as has been said by one of the logicians, "The eye, &c., have their objects as described ; but mind externally is dependent on the others."

Nor can *inference* be the means of the knowledge of the universal proposition, since in the case of this inference, we should also require another inference to establish it, and so on, and hence would arise the fallacy of an ad infinitum retrogression.

Nor can *testimony* be the means thereof, since we may either allege in reply, in accordance with the Vais'eshika doctrine of Kanáda, that this is included in the topic of inference ; or else we may hold that this fresh proof of testimony is unable to leap over the old barrier

\* Literally "must be an attribute of the subject and have invariable attend-  
edness (*vyápti*.)"

† For the *sandigdha* and *nis'chita upádhi* see Siddhánta Muktávali, p. 125.  
The former is accepted only by one party.

‡ Literally, the knowledge of the invariable attendedness (as of smoke by fire).

§ The attributes of the class are not always found in every member,—thus  
idiots are men, though man is a rational animal ; and again, this particular smoke  
might be a sign of a fire in some other place.



that stopped the progress of inference, since it depends itself on the recognition of a *sign*, in the form of the language used in the child's presence by the old man;\* and moreover there is no more reason for our believing on another's word, that smoke and fire are invariably connected, than for our receiving the ipse dixit of Manu, &c., (which of course we Chárvákas reject).

And again, if testimony were to be accepted as the only means of the knowledge of the universal proposition, then in the case of a man to whom the fact of the invariable connection between the middle and major terms had not been pointed out by another person, there could be no inference of one thing (as fire) on seeing another thing (as smoke); hence, on your own shewing, the whole topic of inference for oneself† would have to end in mere idle words.

Then again *comparison*,‡ &c., must be utterly rejected as the means of the knowledge of the universal proposition, since it is impossible that they can produce the knowledge of the unconditioned connection (*i. e.* the universal proposition), because their end is to produce the knowledge of quite another connection, viz., the relation of a name to something so named.

Again, this same absence of a condition,§ which has been given as the definition of an invariable connection (*i. e.* a universal proposition;) can itself never be known; since it is impossible to establish that all conditions must be objections of perception, and therefore although the absence of perceptible things may be itself perceptible, the absence of non-perceptible things must be itself non-perceptible, and thus, since we must here too have recourse to inference, &c., we cannot leap over the obstacle which has already been planted to bar them. Again, we must accept as the definition of the condition, "it is that which is reciprocal or equipollent in extension|| with the major term,

\* See Sáhitya Darpaṇa (Dr. Ballantyne's trans. p. 16) and Siddhānta M. p. 80.

† The properly logical, as distinguished from the rhetorical, argument.

‡ "*Upamāna* or the knowledge of a similarity is the instrument in the production of an inference from similarity. This particular inference consists in the knowledge of the relation of a name to something so named." Dr. Ballantyne's *Tarka Sangraha*.

§ The *upādhi* is the condition which must be supplied to restrict a too general middle term, as in the inference 'the mountain has smoke because it has fire,' if we add wet fuel as the condition of the fire, the middle term will be no longer too general. In the case of a true *vyāpti* there is of course no *upādhi*.

|| *Αντιστρέφει*. We have here our own *A* with distributed predicate.

though not constantly accompanying the middle.” These three distinguished clauses, “not constantly accompanying the middle term,” “constantly accompanying the major term,” and “being constantly accompanied by it” (*i. e.* reciprocal), are needed in the full definition to stop respectively three such fallacious conditions, in the argument to prove the non-eternity of sound, as ‘being produced,’ ‘the nature of a jar,’ and ‘the not causing audition;’\* wherefore the definition holds,—and again it is established by the s’loka of the great Doctor beginning *samásama*.†

But since the knowledge of the condition must here precede the knowledge of the condition’s absence, it is only when there is the knowledge of the condition, that the knowledge of the universality of the proposition is possible, *i. e.* a knowledge in the form of such a connection between the middle term and major term as is distinguished by the absence of any such condition; and on the other hand the knowledge of the condition depends upon the knowledge of the in-

\* If we omitted the first clause and only made the upádhi “that which constantly accompanies the major term and is constantly accompanied by it,” then in the Naiyáyik argument ‘sound is non-eternal, because it has the class of sound,’ ‘being produced’ would serve as a Mímánsik upádhi, to establish the *vyabhihára* fallacy, as it is reciprocal with ‘non-eternal;’ but the omitted clause excludes it, as an Upádhi must be consistent with *either* party’s opinions, and of course the Naiyáyik maintains that ‘being produced’ *always* accompanies the class of sound. Similarly if we defined the upádhi as ‘not constantly accompanying the middle term and constantly accompanied by the major,’ we might have as an upádhi ‘the nature of a jar,’ as this is never found with the middle term (the class or nature of sound only residing in sound, and that of a jar only in a jar,) while at the same time wherever the class of jar is found there is also found non-eternity. Lastly if we defined the upádhi as “not constantly accompanying the middle term, and constantly accompanying the major,” we might have as a Mímánsik upádhi ‘the not causing audition’ *i. e.* the not being apprehended by the organs of hearing; but this is excluded, as non-eternity is not always found where this is, ether being inaudible and yet eternal.

† This refers to an obscure s’loka of Udayanáchárya, “where a reciprocal and a non-reciprocal universal-connection (*i. e.* universal propositions which severally do and do not distribute their predicates) relate to the same argument (as *e. g.* to prove the existence of smoke,) there that non-reciprocating term of the second will be a fallacious middle, which is not invariably accompanied by the other reciprocal of the first.” Thus ‘the mountain has smoke because it has fire’ (here fire and smoke are non-reciprocating, as fire is not found invariably accompanied by smoke though smoke is by fire,) or ‘because it has fire from wet fuel’ (smoke and fire from wet fuel being reciprocal and always accompanying each other); the non-reciprocating term of the former (fire) will give a fallacious inference, because it is also, of course, not invariably accompanied by the special kind of fire, that produced from wet fuel. But this will not be the case, where the non-reciprocating term is thus invariably accompanied by the other reciprocal, as ‘the mountain has fire because it has smoke;’ here though fire and smoke do not reciprocate, yet smoke will be a true middle, because it is invariably accompanied by heat which is the reciprocal of fire.



variable connection. Thus we fasten on our opponents as with adamantine glue the thunderbolt-like fallacy of reasoning in a circle. Hence by the impossibility of knowing the universality of a proposition it becomes impossible to establish inference, &c.\*

The step which the mind takes from the knowledge of smoke, &c., to the knowledge of fire, &c., can be accounted for by its being based on a former perception or by its being an error; and that in some cases this step is justified by the result, is accidental just like the coincidence of effects observed in the employment of gems, charms, drugs, &c.

From this it follows that fate, &c.† do not exist, since these can only be proved by inference. But an opponent will say, if you thus do not allow *adrishṭa*, the various phenomena of the world become destitute of any cause. But we cannot accept this objection as valid, since these phenomena can all be produced spontaneously from the inherent nature of things. Thus it has been said,

The fire is hot, the water cold, refreshing cool the breeze of morn,  
By whom came this variety? from their own nature was it born.

And all this has been also said by *Bṛihaspati*.

There is no heaven, no final liberation, nor any soul in another world,  
Nor do the actions of the four castes, orders, &c., produce any real effect.  
The *Agnihotra*, the three *Vedas*, the ascetic's three staves, and smearing  
one's self with ashes,  
Were made by Nature‡ as the livelihood of those destitute of knowledge  
and manliness.

If a beast slain in the *Jyotishṭoma* rite will itself go to heaven,  
Why then does not the sacrificer forthwith offer his own father?  
If the *S'rāddha* produces gratification to beings who are dead,  
Then here too in the ease of travellers when they start, it is needless to give  
provisions for the journey.

If beings in heaven are gratified by our offering the *S'rāddha* here,  
Then why not give the food down below to those who are standing on the  
housetop?

\* Cf. Sextus Empiricus, P. Hyp. ii.—In S. D. S. pp. 7, 8, we have an attempt to establish the authority of the universal proposition from the relation of cause and effect or genus and species.

† *Adrishṭa*, i. e. the merit and demerit in our actions which produce their effects in future births.

‡ I take *Dhātṛi* as = God, or nature, speaking by common parlance. Dr. Hall (Catalogue, p. 162) would seem to take *Dhātṛi* as the name of an author,—*Dhātṛi* may sometimes stand for *Bṛihaspati*.

While life remains, let a man live happily, let him feed on ghee, even though  
he runs in debt,

When once the body becomes ashes, how can it ever return again ?

If he who departs from the body goes to another world,

How is it that he comes not back again, restless for love of his kindred ?

Hence it is only as a means of livelihood that Brahmans have established  
here

All these ceremonies for the dead,—there is no other fruit anywhere.

The three authors of the Vedas were buffoons, knaves and demons.

All the well known formulæ of the pandits, jarpharí, turpharí, &c.\*

And all the obscene rites for the queen commanded in the *Aswamedha*,

These were invented by buffoons, and so all the various kinds of presents to  
the priests,†

While the eating of flesh was similarly commanded by night prowling  
demons.

Hence in kindness to the mass of living beings must we fly for  
refuge to the doctrine of Chárváka. Such is the pleasant consum-  
mation.

It would have been an interesting inquiry, if we could have traced  
the relations between the Hindu materialism and the orthodox systems  
on the one hand and Buddhism on the other. But we can only weary  
ourselves with asking questions to which there can be no answer, as  
all traces of chronology and successive development have been obli-  
terated in the present sūtras of the Dars'anas. Each one now seems  
to imply the contemporary existence of all the rest, and consequently  
for historical purposes they are delusive and useless. We can only  
tell that at a very early period in Hindu speculation, the “negative  
arm” was unusually vigorous ; and it would not perhaps be impossible  
to reconstruct from still extant allusions a complete series (though  
not in chronological order,) corresponding in Greek philosophy to that  
from Xenophanes to Sextus Empiricus.

\* Rig veda, x. 106.—For the *As'wamedha* rites, see Wilson's Rig V., preface,  
Vol. ii. p. xiii.

† Or this may mean “and all the various other things to be handled in the  
rites.” There seems something omitted in the s'lokas, as only two classes are  
specified, and we should naturally expect that the knaves would have been con-  
nected with the various offerings to the priests.—Could we venture to read भण्ड-  
कानां for पण्डितानां, and धर्तैः for भण्डैः ?



By way of conclusion to this paper I subjoin a singular passage from the Uttara Naishadha of S'rí Harsha, which puts together in a compact form the principal Chárváka arguments against the authority of the Veda, the Smṛiti, and the orthodox philosophical systems. S'rí Harsha (whatever his precise date\*) lived late in the silver age of Sanskrit literature, but his works have a great authority in such matters, as he had a profound acquaintance with every part of Hindu philosophy ; and hence his poems enjoy a great celebrity even among Naiyáyik Pandits, who, as a rule, are generally considered to despise the 'primrose path' of poetry.†

He represents the five deities as returning to heaven from Dama-yantí's Swayamvara, and on their way they meet the retinue of Kali, the presiding dæmon of the iron age. Foremost in the multitude are seen Káma, Anger, Covetousness and Folly, and behind them follow a tumultuous throng of worshippers, among whom the representative of the Chárváka philosophy holds of course a pre-eminent place.

As this host drew near, like a sea that hath burst its bounds,

The gods heard from some one in the midst words harsh to their ears.

"The truth of the S'ruti for the effect of sacrifices is like that which tells of stones that swim ;‡

What faith can we place in it, Oh ye grey-bearded sages, that the path of enjoyment should be left ?

A certain Bodhisatwa has arisen to give a mortal stab to the Veda,

Who has declared by infallible proofs that all the world is in a state of flux.§

The daily fire, the rules of the Veda, the ascetic's vow, the sectarian mark of ashes,—

Bṛhaspati tells us that these are the livelihood of those who lack sense and manhood.

Purity of caste consists in the purity of both lines of our ancestors through each backward generation ;

Then what caste can be faultless now, divided as each is into endless families ?

Through the contact of women, what man is there undefiled by sin ?

Why then does the infatuated world fast and bathe debarred from enjoyment ?

\* See Dr. Hall's Vāsavadattá, Preface.

† The *S'rotriya-jaranmímánsakádayah* are excepted from the hopeful students of poetry by the Sáhitya Darpaṇa.

‡ This alludes to some Vaidic passage *grávánah plavanti*, which seems to have become proverbial, cf. Maháviracharitra, p. 13.

§ Alluding to the well-known doctrine of the Buddhist sect, the Mádhyamikas, *sarvam kshanikam*, πάντα βῆι. It is worth observing that S'rí Harsha, in common with most later Hindu authors, confounds the Buddhists and Chárvákas.

Fie on those who boast of the purity of their race and jealously keep their women secluded,

And yet keep not their men secluded, though each sex is equally blinded by passion.

That s'ástra which forbids adultery,—idle illusion as it is,—

Was itself disregarded by Indra when he wooed Ahalyá.\*

Oh Bráhmans, cease to attribute sin to approaching a guru's wife,

Since your Master,† the Moon, plunged reckless into this snare.

“The dead hath torment from his sins and joy from his merits,” thus saith the Veda,

But sense-evidence attesteth the contrary,—it is for you to determine which is the stronger.

If sin is to be avoided, from the possibility that we may attain another body after death,

Then, Bráhmans, cease to sacrifice from the possibility of the sin of injuring living animals.

How can you put faith in good actions (*sukṛita*) and not in good enjoyments (*surata*)?

Let a man do that action by which at the end his happiness is increased.

Commit sins as forced by your passions, and then they will be as not done,

Manu said that those actions were as not done which were committed by force.‡

Oh ye followers of tradition, dispute not this passage of your own s'ástras,

But follow every pleasure which your heart may desire.

Where is there union among the learned in the interpretation of S'ruti and Smṛiti?

Interpretation depends on the interpreter's power of mind,—wherefore despise not ours which leads to happiness.

When the body is once burned, which is the true subject of the thought ‘I am,’ what becomes of sin?

If the soul, which is separate and the witness, is to suffer, then why not any other unconnected thing?

The dead man remembers his former births,—the successive waves of the fruits of actions affect the dead,—

The dead hath pleasure in food eaten by Bráhmans,—enough of this talk of knaves!

By men who *feel* that they are only body,—when told that they are something else,

This very body is disregarded and some other object accepted, through the all-deceiving Veda's influence!

\* May we not compare Terence (Eun. III. 5), as exemplified in St. Augustine's confessions (I. 16)? The same argument recurs in the Das'akumára Charitra.

† Soma is the king of the Bráhmans as Indra of the Kshatriyas (Taitt. Sanhitá, I. 8. 10).

‡ Manu, viii. 168.—Cf. Aristotle, Nic. Ethics. III. 1, 23.



One side of an alternative *must* come to pass,—so when the desire is fulfilled  
The cheats say their mantras were the cause, which in case of failure were not  
rightly performed.\*

If He alone by the sins of all is already plunged into infinite suffering,†  
Then, timid one, how can this revealed Soul feel any new burden through sin of  
thine?

Of what use is a flower plucked from its stalk? only when growing thereon does it  
bring forth fruit;

If thou would'st place it on the head of a stone, as identical with deity,‡ then why  
not place it at once on thine own?

Fling away like empty chaff thy bitter speeches against women,—

Why longer deceive the world, when thou thyself art equally depraved?

Follow the commands of Kámadeva, which even Brahmá and the rest did not  
disobey;

The Veda is the command of the gods, and what command more authoritative  
than his?

If you allow that a part of the Veda is only idle repetition,§

Then by what ill-fortune do you hold it not of those parts which inflict toil and  
expense?

Ye believe the authority of the Veda, stout-hearted champions in Vaidic discus-  
sions,

And yet, bewildered as ye are, yourselves pronounce interpolated the passage  
that enjoins the gift of the elephant tied to the post.

The Vaidic passage which says, “Who knoweth what is in the other world,”

By that very authority how can one accept another world at all?

Manu,—talking of merit and demerit, the one impossible to be gained as the  
other to be avoided,

And seeking under the pretext to mulct mankind,—has been idly followed by the  
learned.

‘Verily by the words of Vyása comes faith in another world,’ thus ye say, logi-  
cians as ye are;

O ye disciples of the fish, who would deign even to call you fishes?

That Vyása of yours, the Court poet of the Pándavas, well versed in the syc-  
phant's art,

When was he ever known to speak a contrary word, if his patrons either  
praised or blamed?

Did not Vyása through passion commit adultery with his brother's wife?

\* Cf. the Bengali proverb, আমার হাতযশ ও তোমার কপাল.

† Alluding to the Vedántic doctrine that all are Brahma.

‡ I. e. as the S'alagrám, &c., as identical with Vishnu, &c. I would read in the  
second line ত্বনুর্ধ্বি.

§ Alluding to the *arthaváda* as distinguished from the *vidhi*.

Or again when he loved his maidservant, can his mother's command be his excuse *then*?\*

Books made by gods and Bráhmans are your only authority for paying them homage,—

And see ye not, when ye bow down to the cow, ye debase yourselves even lower than *that*?

Bravely have our passionless priests relinquished desires—ever hankering after sacrifices,

And longing, even when they are dead, to obtain a heaven of apsaras with eyes like fawns.

Why seek to be passionless, ye sages? rather labour to win the love of the fair;

When once a creature is dust, it is idle to think that he comes hither again.

Let both sexes devote themselves to enjoyment,—such is the opinion

Even of the Muni Páṇini, when he said “*apavarge tṛitíyá.*”†

Men dive into the Ganges in hopes to rise higher thereby

Like a ram forsooth who retreats backward before he rushes forward to charge!

Why should we fear such Vaidie threats as “by this sin one will become a beast?”

Even the rájila‡ is as happy as a rája in its own means of enjoyment.

If the slain in battle rejoice in heaven,§ then the demons,

Slain by Vishnu in battle, may fight with him there, slain though they be.

“In the world there is Brahma and the self,|| in liberation there is only Brahma,”

Oh the wisdom of the Vedántists who would make liberation to be the self's obliterating!

He too who propounded his system that a stone's state is the true liberation,—

You may well call him Gotama, for a superlative fool was he.¶

The wives of S'iva, Vishnu, &c., are intensely devoted to their lords;

Why then are they still the prisoners of love—why have they not attained to liberation?

If there be a Supreme Being all-knowing, all-merciful, and whose word never fails,

Then why does he not make us, suppliants, happy by the mere expense of a word?

The Supreme producing sorrow to mortals, arising from their evil deeds,

Would be an enemy without a cause, while others hate only when provoked.

Since all are equally vacillating in proof and each destroys the other,

What opinion is there which is not futile, just like two contradictory premises?

\* His mother had given him her command in the first case as his brother died without issue, but this excuse will not hold in the second.

† This grammatical rule (Pán. II. 3, 6) properly means “the third (case is to used) when the action is continuously performed till the desired end is obtained,” (as “he read it in a month,” *máśena*,) but S'ríharsha puns on each word and makes it mean “the third (*i. e.* in the list of objects of human desire—merit, wealth, enjoyment and final liberation) is to be used to obtain the final end.”

‡ A kind of snake.

§ Bhag. Gítá, II.

|| *Swa* means here the individual soul. He now proceeds to attack the different systems of philosophy, beginning with the Vedánta.

¶ *Go + tama*. For the *mukti* of the Nyáya, see Nyáya Sút. I. 22.



Ascetics, wrathful themselves, teach others to restrain their wrath,  
Just as the penniless alchemist will teach you the rules to turn everything to  
gold.

Why give away your wealth? S'rí, Vishnu's beloved, loves him who giveth not;  
Poor Bali, who gave away all his wealth to the dwarf, found a chain as his reward.  
(Give not) for every body desires to rob or injure the wealthy man;  
Hardly one can be found who sits tranquil and has flung away the greed of gain.  
Not to steal makes poverty thrive, to hold any food unlawful cheats the belly;  
Live then as you will, this is the only root which bears the shoot of happiness."  
Having heard these evil words Indra burst into anger,  
And loudly exclaimed, "Who is this that stabs the heart of religion?  
Who dares thus to speak while I, Indra, rule the three worlds,  
I with my hand flashing with the thunderbolt, and the worlds with the three  
Vedas as their eyes!

As for the non-commixture of the castes, their continuance or interruption,—  
Bow to the proof that no murderer has escaped on this plea in the ordeals.  
The paramour of a woman known to belong to the upper castes, finds not victory  
in his oath,—

This fact proclaims the purity of the generations of all the castes.  
Thou acknowledgest the ordeals of water and fire, as ordained in the Veda,  
For shame,—do not these force thy mind to throttle these atheistic thoughts?  
Even though the marriage rites are lawfully performed, the production of issue is  
uncertain,—

Oh ye atheists, how is it that some unseen cause pierces not your hearts with  
conviction?

Why believest thou not the stories, attested by men of different countries,  
Of men born again as goblins who have assumed some body and implored a  
s'ráddha at Gayá?

How dost thou not credit the corroborating stories of another world  
Told by men on their return who have been seized by Yama's messengers under  
a mistaken name?"

Then the god of fire flamed forth and scornfully addressed him,  
"How dardest thou in our presence thus to speak with unbridled tongue?  
Oh thou who faintest at a moment's fast, art thou not astounded to remember  
The ancient fasters of twelve days and nights who supported life by the sole  
power of their religion?

The visible effects which follow such rites as that for a son, and the hawk and karíra  
offerings,\*—

How is it that these do not dispel like sunrise the prowling demons of thy  
doubts as to religion?"

\* The hawk sacrifice is used to imprecate destruction on an enemy. For the offering made with the fruit of the capparis aphylla (*Karíra*), for rain, see Taitt. Sanh. II. 4, 7—10.

Then making the sky flash with sparks as he shook his staff to and fro,  
Yama thus poured forth the waves of his speech, as if his heart was pierced by  
the other's words.

"Stay, stay while I forthwith silence thy lips and throat,  
Wretch as thou art that utterest these hostile words in the midst of our assembly.  
Oh Lokáyata, who for thy mere words will give up the other world,  
Established by the Vedas and hundreds of opinions that wear the garb of the  
Veda ?

When there is a dispute about the true road, between a few and many of equal  
claims to knowledge,  
As thou wouldst act in regard to an earthly journey,—why not thus too as re-  
gards another world ?

Whoso sees the consent of all men to give away their daughters to others,\*  
How can that man's faith but be firm in the reality of another world ?  
If *any* opinion be true, then those who forsake all opinions must be undone ;  
If a rite fails, it is only the defect of fruit, but positive injury can never come  
from following duty.

Either from the general consent of mankind, or the fear of guilt to be incurred,  
Some Vaidic principles are obeyed by all,—then, if these, why not *all* for their  
sake ?"

Then spake Varuna, red with wrath, a speech devoid of pity,

"Base heretic, why fearest thou not my tremendous noose ?

There are stones beyond man's power to make, marked with Vishnu's incarna-  
tions,

How is it, ye fools, that these do not persuade you to the path of the holy ?

Indra's title S'atakratu and the very names of the castes, as born from the thigh,  
&c.†

Why do not these confound you with the old traditions of the Veda ?

How do ye not believe the Vedas when ye see by sense perception

The dead animating various shapes and imploring a s'ráddha at Gayá, &c. ?

Forsake not the Vedas when ye yourselves behold men bearing witness to their  
truth

Who have been carried to Yama by some mistake of name and have then re-  
turned to their bodies."

Then stepping forth from Kali's host, which stood paralysed by the wrath of the  
gods,

The varlet thus lifted his voice, raising folded hands to his forehead,

"I am not guilty, oh lords of heaven,—I am subject to another's will,

I am but the bard of the Kali Yug,‡ fair-tongued to flatter it."

\* It would not be done but for the S'ruti's command.

† S'atakratu is a common Vaidic and non-Vaidic name of Indra (*e. g.* Rig V. I. 4, 8.) The mythic origin of the four castes occurs in the Purusha-súkta.

‡ In Schlegel's Rámáyana we find Jábáli similarly apologising.



The most remarkable part of this singular episode is the rejoinder of the four gods to the Chárváka's attack, as it is difficult to conceive that the arguments adduced could ever have been considered as of any weight in the discussion. It is perhaps a bold surmise, but I cannot help drawing the inference, that we have here a symptom of a very important phase of Hindu thought which has been only casually noticed by European inquirers. S'rí Harsha is the advocate of a peculiar school of Hindu philosophy, which holds the same place between the older Dars'anas and the absolute negation of the Chárvákas, as the sceptical school of Pyrrho and the new academy of Arcesilaus did with regard to the older Greek systems and the later Epicureans. "Academici novam induxerunt scientiam, nihil scire," says Seneca; and Pyrrho's doctrines are well enough known to us in that "armoury of scepticism," Sextus Empiricus, where every department of human knowledge is attacked, and every affirmation or negation met by the same unruffled ἐποχή between equally balanced alternatives.

In the same way S'rí Harsha in his celebrated work *Khaṇḍana-Khaṇḍa-Khāḍya* ('the sweetmeat of universal refutation') has endeavoured to establish a quasi Vedantic ἀκαταληψία or ἐποχή of his own. He tries to show that every system of philosophy involves in its first principles the elements of its own overthrow, and each in turn falls before his analysis. The only thing that remains amidst this universal refutation is the mere fact that we know,—the object matter of this knowledge is alike illusory and impossible, but the exercise of intelligence in our knowing is true. To use his own words, "we in fact, desisting from any attempt to establish the existence or the non-existence of the external world, are perfectly contented to rest all our weight on the one Brahma, identical with thought, established by its own evidence; but as for those who descend into the arena of controversy and desire by means of their own imagined arguments and refutations to discover and establish the actual truth of things, we can always maintain as against them, that their mode of procedure is fallacious, since it can always be confuted by the very principles that they lay down." And again "the only difference between us and the Saugatas (or Buddhists) is that they maintain that everything is inexplicable (*anirvachanīya*), while we maintain that everything is inexplicable except the mere fact of knowing." We are hardly likely, therefore, to be doing S'rí Harsha much injustice, if we

interpret his dialogue between the gods and the materialist as involving a deeper meaning than a mere episode in a romance; its issue was premeditated and his sympathies were with the aggressor. To him the contest was not one between truth and falsehood, but simply between equally balanced alternatives of doubt, and materialism in his eyes was only one of the manifold varieties of possible opinion which might equally serve to amuse the mind in life's weary playground. The true philosopher would look down on the busy scene, *endless* alike in aim and duration, from his ἀκαταληψία as from Lucretius' watch tower,

Despicere unde queas alios, passimque videre  
Errare atque viam palantes quærere vitæ.

How different from the creed of Plato, as he puts it in the mouth of Simmias, in the immortal dialogue with Socrates in prison,—“It seems to me, as perhaps it seems to thee, that to know the certainty of such matters in this life is impossible or at any rate most difficult; but he were the veriest craven who for all this would shrink from proving to the uttermost every opinion current among men, resolved never to desist until fairly worn out with exploring in every direction. For one at least of three things we ought to achieve,—either to learn from others where truth is to be found or, may be, to find it ourselves,—or else if this be impossible, then to take the best and least disputable of human opinions, and risking our fortunes thereon like him who commits himself to a raft, to sail across this life, unless one can embark on some surer vessel or some divine demonstration.”

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*Vestiges of the Kings of Gwalior.*—By BÁBU RÁJENDRALÁLA  
MITRA.

Ordinarily, monumental history rectifies or completes written history. But in India, where oblivion has gloriously triumphed over all ancient records, making puzzles of Cyclopean erections, and turning old glories into dreams; where most of her sovereigns and great men live not in the pages of a Xenophon or a Thucydides, but in a few fanciful fables, rude coins, smouldering ruins, and blotted inscriptions; it has to establish a history and not to rectify it. Hence it is, that in India it has a value which is utterly unknown in other parts of the civilized world. It has already thrown valuable light upon the annals of many a prosperous reign; and much is yet expected of it. Our As'okas and Guptas live but in their inscriptions and coins, and our Scythians and Indo-Bactrians and Shah Kings have left to us their only vestiges in their mint-marks. Individual inscriptions and coins may not often yield matter of engrossing importance, but as most inscriptions of by-gone times, when only kings and princes and such like men could afford the luxury of recording inscriptions, contain something which in connexion with others may be of interest in elucidating the annals of the country, I trust, the following analyses and translations of some from the celebrated fortress of Gwalior, affording as they do the traces of a number of sovereigns, mostly unknown to Oriental scholars, will not be altogether unacceptable to the readers of the Journal. For fac-similies of these inscriptions, I am indebted to the Government Archæological Enquirer, Colonel Alexander Cunningham, who has been kind enough to place at my disposal, for publication, reduced copies of several of them in anticipation of a paper by him on the antiquities and history of Gwalior.

Pere Tieffenthaler in his description of Agra has given a long list\*

\* The list runs as follows:—

*Suite des Rajahs gentils de Gualier, de la race de Catschua.*

1. Le premier a été *Souradj sen*, qui changea son nom en celui de *Souradjpál*, et batit la fameuse forteresse de *Gualier*, l'an 332 de l'Ere Indienne appelé l'Ere de *Bikarmatschet*. Il la nomma *Gua-*

*lier* d'après un Hermite nommé *Gualipa*, qui le guérit de la lèpre avec l'eau tirée d'une fontaine (ou source) et qui l'anima et l'aida á construire cette forteresse. *Souradjpál* la gouverna, ainsi que son district pendant, ... Ans. 36  
2. Son fils *Respál* lui succéda, mais ne gouverna qu'un, ... 1

of a race of kings, the first of whom Souradj Pál or S'urya Pála is said to have been the founder of the fort under notice. He built it in the year of Samvat 332 = A. C. 275, and dedicated it to his patron saint Gualipa. The story runs that this worthy had predicted that the race in question, the Kachvaha, would hold the place as long as they should retain the surname Pála, but that the first transgressor would forfeit the heritage and for ever. Accordingly the successors of

|                                     |                                    |    |
|-------------------------------------|------------------------------------|----|
| 3. Ensuite le fils de celui-la      | 42. Sindhoupál, ...                | 7  |
| Narhalapál, ... 0                   | 43. Mahespál, ...                  | 9  |
| 4. Apres le preccdent, Amar-        | 44. Ruddarpál, ...                 | 13 |
| pál, ... 10                         | 45. Madanpál, ...                  | 20 |
| 5. Bhimpál, ... 25                  | 46. Adjepál, ...                   | 14 |
| 6. Gangpál, fils du préc, ... 21    | 47. Sadhanpál, ...                 | 20 |
| 7. Radjpál, de même, ... 10         | 48. Birbhadarpál, ...              | 13 |
| 8. Bodjpál, de même, ... 10         | 49. Candarpál, ...                 | 21 |
| 9. Padampál, de même, ... 29        | 50. Sedjpál, ...                   | 21 |
| 10. Anangpál, de même, ... 12       | 51. Dewenderpál, ...               | 25 |
| 11. Enderpál, ... 3                 | 52. Ramtschand Issorpál, ...       | 30 |
| 12. Mahendarpál, ... 13             | 53. Houdpál, ...                   | 6  |
| 13. Djenatpál, ... 14               | 54. Saroudjenpál, ...              | 9  |
| 14. Bassantpál, ... 17              | 55. Paroudjenpál, ...              | 2  |
| 15. Scheoupál, ... 3                | 56. Reskpál, ...                   | 19 |
| 16. Dhandpál, ... 11                | 57. Anangpál, ...                  | 7  |
| 17. Latschmipál, ... 4              | 58. Anantpál, ...                  | 5  |
| 18. Lohendarpál, ... 2              | 59. Gadjpál, ...                   | 7  |
| 19. Bhanderpál, fils du préc,       | 60. Zagdigpál, ...                 | 30 |
| fondateur de la forteresse et de la | 61. Gangpál, mort sans enfans, ... | 31 |
| ville de Bhander, ... 0             | 62. Ramdewpál, ...                 | 20 |
| 20. Adjepál, (Tous ceux qu'on       | 63. Bhoupál, ...                   | 3  |
| vient de nommer descendoient de     | 64. Hartschandpál, ...             | 17 |
| Souradjpál,) ... 9                  | 65. Birkhpál, ...                  | 3  |
| 21. Adjepál succeda Assapál, ... 0  | 66. Tilekpál, ...                  | 11 |
| 22. Sehspál, ... 0                  | 67. Bedjepál, ...                  | 9  |
| 23. Bhodjpál, ... 0                 | 68. Dandherpál, ...                | 6  |
| 24. Bherounpál, ... 0               | 69. Nilcanthpál, ...               | 5  |
| 25. Cantpál, ... 0                  | 70. Partab Rudderpál, ...          | 10 |
| 26. Tsehandar Soukhpál, ... 0       | 71. Madhpál, ...                   | 7  |
| 27. Goumnatpál, ... 0               | 72. Bhopál, ...                    | 3  |
| 28. Nakesspál, ... 0                | 73. Assoupál, ...                  | 30 |
| 29. Ságarpál, ... 0                 | 74. Enderpál, ...                  | 5  |
| 30. Madhpál, ... 0                  | 75. Kerpál, ...                    | 3  |
| 31. Amharpál, ... 0                 | 76. Kəranpál, ...                  | 16 |
| 32. Kantpál, ... 0                  | 77. Agarpál, ...                   | 0  |
| 33. Kirathpál, ... 3                | 78. Manpál, ...                    | 3  |
| 34. Danipál, ... 19                 | 79. Beschannpál, ...               | 21 |
| 35. Bhippál, ... 4                  | 80. Sagarpál, ...                  | 16 |
| 36. Hamirpál, ... 9                 | 81. Ender Sehspál, ...             | 11 |
| 37. Tschatarpál, ... 3              | 82. Rempál, ...                    | 1  |
| 38. Bhounenderpál, ... 10           | 83. Houmarpál, ...                 | 19 |
| 39. Hirpál, ... 30                  | 84. Boudhpál, ...                  | 27 |
| 40. Nakenderpál, ... 6              | 85. Tedjcaran, Fils de Boudh-      |    |
| 41. Sindhpál, ... 2                 | pál, ...                           | 0  |









S'urya uninterruptedly held the stronghold and the territory around it for several centuries, until at last a daring prince, in the person of the 85th descendant, Tejakarna, neglected the surname and lost the principality to the Pauvars of Amber. How far this fable is worthy of credit, it is scarcely worth while to enquire; never in the history of Indian principalities within the last two thousand years, has there been an instance of uninterrupted succession of 85 potentates of one race all enjoying the same patronymic; while certain it is that during the period which would belong to the Pálas, there were several kings of the Pramára and other races who exercised the powers of either immediate rulers or suzerains, over Gwalior. This fact would argue very strongly against the authenticity of Tieffenthaler's list; nevertheless we think it possible that a small principality with limited powers, sometimes independent and sometimes in vassalage, might exist for a long series of years in the same family. At any rate it will not be too much to assume, on the strength of the tradition which has borne paternity to the list, that the Kushites were the founders of Gwalior and that they did long exercise sovereignty within its precincts. No monument, however, has yet been found which records the name of any of the Pálas, as an immediate ruler of that place.

The earliest name that has been found in any inscription in connexion with Gwalior is that of Toramána, and next that of Pashupati his son. But both are put down for suzerains and not immediate rulers, and this is most probable as we find their names in connexion with Malwa, Guzerat and Kashmir, where the Pálas have had no control. The record which bears their name exists on a Vaishnavite temple in the fortress of Gwalior and is marked No. 1 (Plate I. fig. 1) in Colonel Cunningham's collection.

A translation of it has already been published in this Journal along with a conjecture of mine on the identity of the sovereigns named in it with two of the Gonerdyas Kings of Kashmir.\* How

\* Professor Fitz-Edward Hall, M. A., D. C. L., Inspector of Schools, Sagore Division, North-Western Provinces, has honored me with a patronising tap on the shoulders for this paper (Ante Vol. XXX. p. 383). He hails it "as an encouraging sign, that the natives of this country are beginning, here and there, to evince an intelligent interest in the history of their forefathers," although the paper is not the first of my contributions to the pages of this Journal. As in 1847, I had for some months had the honor of giving the learned Doctor lessons in Bengali, I feel very thankful to him for the kindness with which he notices me

far the opinion there hazarded is based on facts, it is not for me now to enquire ; I am glad, however, to perceive that Dr. Bháu Dájí of

after the lapse of so many years. He is even condescending enough to say "Consulting the Bábu's welfare I would, however, exhort him to the study of acenraey, and to an advised consideration in the choice of his premises." As a general maxim it will, I hope, prove widely useful. I receive his advice with a deep sense of gratitude, and promise always to bear it in mind. To shew that I have already benefited by it, I must, even at the risk of being tedious, adduce my premises for the errors in his reading of the Iran inscriptions to which I take exception. Dr. Hall has attributed most of them to the printers (Ante XXX. p. 149), but it is difficult to conceive how those scape-goats are to be responsible for the word *sansurata* which Dr. H. altered into *sansurabhu* without any authority. Again he commented upon the word पितरमनुजातस्य as "a hoary solecism in Sanserit books" and translated it, "who was the counterpart of his sire." Prinsep has "father's-talent-possessing," and Goldstücker explains the word अनुजात in his Dictionary by "born like or with similar qualities as (another)." Next he translates सवंशवृद्धिहेतोः into the unmeaning "derived prosperity to his race," when he should have followed Prinsep and given "for the prosperity of his race." Regarding the elegant simile of a *king electing his wife like a maiden her husband*, the Doctor says, that as soon as he saw his paper in print, he amended it for his "private eye." Unfortunately, however, when some months after he prepared for the public eye his bulky errata it entirely escaped him, and as I happened not to have the faculty of ubiquitousness I could not benefit by the emendation. The dissyllable मान which Dr. Hall had overlooked in मानधन and I pointed out in a note to my paper on Toramána, is not a word of any moment, and would have called for no animadversion in connexion with ancient inscriptions where the decypherer has in most cases to grope completely in the dark, but when a critic, professedly the most microscopically exact, comes forward with the avowed object of correcting the errors of such a scholar as Prinsep, it is naturally expected that he should take some precaution to ensure accuracy, and not blunder even in those places where the unfortunate subject of his criticism happens to be correct. His dissertation on the uses of Sanskrita prefixes I shall notice on some future occasion. The subject is of importance and claims more consideration than can be devoted to it in the space of a foot note.

Since writing the above, I find the Doctor has once again come to the rescue of his *sansurabhu*. When he first suggested it as an improvement upon Prinsep's *sansurata* he stated (Ante Vol. XXX. p. 16) "STANDING BEFORE THE ORIGINALS, I COMPARED MY FACSIMILES LETTER BY LETTER WITH THOSE THAT HAVE BEEN LITHOGRAPHED; AND EVEN THE SLIGHTEST DISSIMILARITY OF THE COPIES WAS PATIENTLY TESTED BY THE PERISHING ARCHITYPES." In his first corrigenda, which he published some months after, he added, "It ought to have been remarked that what I read as *sansurabhu* is doubtful in its penultimate syllable and very doubtful in its final. If right render 'in which is the good land of the gods.'" (Ante Vol. XXX. p. 150.) When I expressed a doubt regarding its accuracy, the Doctor administered a severe rebuke to me for my presumption, stating "It goes with the Bábu for but little, I find, as contributing to induce credit in the trustworthiness of my version of the Eran inscriptions, that standing before the originals, I compared my facsimiles, letter by letter, with those that have been lithographed and even the slightest dissimilarity of the copies was patiently tested by the perishing archetypes. The lithographed copies were those of Prinsep." And yet at the same time he fell another step back and was quite undecided as to giving up his reading or abiding by it, for he said (Ante Vol. XXX. p. 387.) "I HAVE FAR FROM INTIMATED ANY CONFIDENCE IN THE CORRECTNESS OF MY READING; and I



Bombay, in his paper on Kálidása,\* arguing on very different grounds, has come to the conclusion that the different Toramáṇas noticed in inscriptions are identical with the prince named in the Rájataran-giní. The date he assigns to them is, however, a century later. This I am not at all surprised at. Dealing with a subject on which exact information is of course impossible, and where historical conclusions are of necessity to a great extent hypothetical it would be remarkable if at least some of my assertions were not met with opposition. The writer of a letter “on some recent statements touching certain of the Gupta Kings and others,” adverting to my remark that the Toramáṇa of Kashmir lived about the end of the fifth cen-

have no partiality for it whatever. The fact is simply that the original symbols looked to me, in the dilapidated condition in which I found them, rather like the constituents of *sansurabhu* than like anything else.” And now to complete the renunciation, we have the learned gentleman in his last paper (ante p. 127) informing his readers, that when his paper in the Eran inscriptions was written, *he had only a facsimile before him and not the original*. This may appear very startling without proof, and I therefore quote his words. “For the second time I have just read the old inscriptions here, (Iran) in the column and on the gigantic stone boar. It has caused me no surprise to find, that my former decipherments of them admit of a few corrections.” (No surprise indeed after the ‘letter by letter’ comparison!) “FOUR MONTHS AFTER MY FIRST VISIT TO ERAN WRITING UNDER THE GUIDANCE OF MY FACSIMILE COPY, (and not the original?) I said of what looked to me like *sansurabhu*, that it is doubtful in its penultimate syllable, and very doubtful in its final. Mr. Prinsep’s lection is *sansuratham*. The result of a close re-examination of the word as it stands on the stone is this. The final syllable is clearly *tri*. The penultimate, judged by what is left of it in its damaged state, could not well have contained any consonant but *k* or *r*. The vowel, if it had one, may have been *á*, *e*, or *o* (Why omit the *i* and the *u*?) Possibly the word was *sansuratri*, and it may be a plausible theory, that it was the name of the country which had the Yamuná and the Narmadá for two of its boundaries. OR IS IT A REPETITION OF THE DATE, AN ABBREVIATION OF SAMVAT FOLLOWED BY THREE LITERAL SYMBOLS OF ARITHMETICAL VALUE? If I had access to Mr. Thomas’ edition of Mr. Prinsep’s Indian Antiquities, it might be easy to say, whether this last suggestion is of any account.” So that what was given with so much positivity as *sansurabhu* now melts into three figures of arithmetic! If patient examination, letter by letter, lead to nothing better, I must hold myself excused for not at once pinning my faith to the new reading of the Gwalior inscription lately published by the Doctor, or joining with him in invoking “the shade of Sákatáyana” to rescue myself from a misprint. I guessed the first word of the Gwalior record to be *jagati* from the *ti* which is alone visible, Dr. Hall would take it for *jayati*, and I gladly let him have his choice: but his conversion of my *jalada nilam* into *jalada khelam* is quite inadmissible. It is used as an adjective to *dhántam* ‘darkness,’ which may well be compared to “black clouds” *jalada nilam*, but not to “playful clouds” *jalada khelam*. The next alteration is *udayagiri* into *udayanaga* both meaning literally the mountain where the sun rises, but *udayanaga* has not the support of Indian usage. The *upadhmániya* is a printer’s blunder, and my *mátápitustathá* is quite as correct as the suggested *mátápitrostathá*, the one being an *itaretara samása*, and the other a *samáhára*.

\* Journal, Bombay Branch Royal Asiatic Society, Vol. VI. p. 220, et seq.

tury observes :\* “No attempt whatever has been made to set aside my implied assignment of him on the basis of an ascertained date to the first half of the second century, and the time of Budhagupta, on which his own depends, is hypothetically reckoned by the Bábu in an era which perhaps began in A. D. 278. The result is a difference of three hundred and thirty-five years.” The ascertained date to which the writer so emphatically appeals is contained in a foot-note to his paper on the Eran inscriptions, (Ante Vol. XXX. p. 15) in which he says ; “Since writing this paper I have had time before sending it to the press, to refer for a solution of the date in question, to my friend Bápu Deva S’ástrin, Professor of Mathematics in the Benares College. He apprises me in reply that it conforms to the era of Vikramáditya and does not conform to that of Sáliváhana. It is therefore, all but demonstrably certain that Budhagupta was reigning on Thursday, the 7th of June, in the year of our Lord one hundred and eight, new style. Toramána must have flourished shortly after him with something of likelihood indeed as his next successor.” Thus the basis is no other than the *ipse dixit* of Pandita Bápu Deva, opposed as it is to the deductions of Prinsep, Thomas, Cunningham, and other distinguished orientalists. I have the highest respect for the Pandita’s learning. But I know not how he can positively deduce from the data of the Eran document, that it was recorded in the era of Vikramáditya and of no other. The date there given is : “In the year 165, on the 12th day of the light fortnight of the month of Áshádha,” according to the revised decyphering published in the last volume of this Journal, and “165, the thirteenth day of the light fortnight, in the month of Áshádha” agreeably to Prinsep’s reading.† The facsimile published by Prinsep is in favour of his version, but the accuracy of that document has been questioned, and therefore until another facsimile is published, it is impossible to decide which of the two is the correct reading. And since the premise thus remains undecided, deductions founded upon it must necessarily be very dubious. Even were I to admit the date of the re-decypherer, I do not think it would follow, (I have not the leisure now to calculate,) that the 12th of the light fortnight in Áshádha on the meridian of Gwalior could be conjoined with a Thursday only on the 165th year of Vikramáditya, and on no other year.

\* Ante Vol. XXX. p. 387.

† Ante Vol. VII. p. 634.





Nº XI. Teli Mandar. Gwalior Fort.

श्रीमकरदेवकसहू



If it be so, still the question would occur, were the calculations of the almanac from which the date was taken, founded upon the meridian of Ujjayiní the best known of India ? or of Lanká ? or of Kanouj ? or of Gwalior ? and if the last, when was the moon's age reckoned ? at its beginning, the middle, or the end ? Without these data, no calculation can be so exact as to give us the era of a document from its date, much less to point out its correspondence with a foreign era with the circumstantiality of new styles and old styles. The testimony of Alberuni leaves no doubt as to the existence of an era of the Guptas, and *a priori* one would suppose that the era which would be current in the time of a Gupta sovereign would be that of his family. To controvert such an idea, it is necessary that we should have something more satisfactory than the ex-cathedra opinion of a single individual. Mr. Thomas and Col. Cunningham are still at issue as to the commencement of the Gupta era, and as long as that point remains unsettled and the date of the Toramána of Kashmir is not proved to be different, the conjecture regarding the identity of the several Toramánas of Eran, Gwalior, Kashmir, and, I may add, of the third Girnar inscription adjoining that of the bridge of Palásiní, will maintain its ground, and the date of that prince left to float between the middle of the 5th to the end of the 6th century. The several dates already assigned to Toramána are, 1st 87-3 B. C. by Professor Wilson, 2nd, 88-9 B. C. by Major Troyer, 3rd, 415 A. C. by Col. Cunningham, 4th, 110 to 120 A. C. by Mr. Hall, 5th, middle of the fifth century by myself, 6th, seventh century by Dr. Bháu Dájí.

Taking Toramána and his son to have been suzerains and the Pálas vassals or feudatories, we know not whether on the demise of the former, the latter assumed independent sovereignty or continued in subjugation to their neighbours ; but we find that in the third quarter of the 9th century, they were placed in subordination to a Bhoja Deva, who called himself a "paramount sovereign." His name occurs in an inscription marked No. 4\* on Col. Cunningham's plates, (pl. II. fig. 4,) and found

\* No. 2 though placed immediately after the record of Pashupati is apparently of a very modern date. It records the dedication of a temple to Srímad Adivaráha or the Boar incarnation of Vishnu, and alludes to the Rámáyana. The characters of the record are slightly removed from the modern Devanágari, but its language is very corrupt, and so intermixed with provincial Hindi and Marhatti (?) as not to admit of a reliable translation.

No. 3 is similar in character to the above and being imperfect is not intelligible. The first line has the name of one Sri Chandra-inika, but who he was, the monument sayeth not.

in a temple of Vishnu at Gwalior. It is a record in prose, in the Kutila character of a somewhat peculiar type, of a grant of three small plots of arable land for a flower-garden, a *serai* or halting-place and a drinking fountain, as also of an edict for the supply of oil and flowers to certain temples. The donor's name is not apparent, and no genealogy is given of the sovereign during whose reign the ordinance was promulgated. The grants, says the record, were made in the year of Samvat 933 = A. C. 876 when the country was under the supremacy of a Lord Paramount Bhoja Deva, whose dominion extended to Turkastána which was governed by his Lieutenant Kottapála Malla or Kongapála Malla. Where this Turkastána was situated it is difficult to make out, although it is evident that it was a large province, and included several sub-divisions or cantons (*sabbiyákas*) having non-Sanskrit names. This would warrant the supposition that it was a Trans-Indian locality and situated somewhere in Baloochistan or Afghanistan. But judging from the fact that the river which is said to flow through it has a purely Indian name—*Vrischikálá*, and the temples of the place belong to the Hindu divinities Rudra, Rudrá-ní, the nine Durgás, and Pushnásá, I feel disposed to think its *locale* was nearer home, probably by the *nulla* which flows by the foot of the hill close by the temple; certainly not quite so far as Delhi to the north, or the Aravalli to the west; the Rájás of Gwalior never having, to the best of our knowledge, held sway beyond those limits. The name of one of the gods, Pushnásá, is of doubtful origin. Pushan is a Vedic divinity and believed to be an ancient term for the sun, and also of the presiding deity of roads,\* but that word by no rule of grammar can become Pushnásá, and the query therefore is suggested as to what relationship it may bear to the Pushan of the Parsees. The names of some of the inhabitants are Hindu, while others have strange cognomens. Some names are partly Indian and partly foreign, such as Ba-illa Bhatta and Naka-illa Bhatta, in which while the latter member is decidedly Sanskrita, the *illa* has a strong Arabic leaning.† The standard of linear measure in the country was peculiar, and known as that of the Lord Paramount—*Párameśwara*. The quantitative measure of *droni* was also different, and peculiar to

\* Vide Wilson's Rig Veda, I. p. 115.

† The *illa* might be a Prákrita corruption of *vatup*, but we have few instances of its use in Hindu proper names.



Gopagiri. The king flourished in Gwalior in the year 876 *i. e.* much more than a century before the great Bhoja of Dhára, predecessor of Udayáditya and the hero of the *Bhoja-prabandha*, and three centuries after the first (540) and two after the second Bhoja of Col. Tod (Jain MSS. 665). He was different too from the Bhojas of Bengal recorded by Tieffenthaler (Bernouli's *Description historique &c. de l'Inde*, Vol. I. p. ), and that of the Thanewara inscription noticed by me (Journal Asiatic Society, Vol. XXII. p. 673). Almost every one of these Bhojas, called himself a "Lord Paramount," and the genealogy of several are wanting. It becomes, therefore, a matter of great concern, how superficial antiquarians jump into conclusions as to the date of any particular record from the mere name of Bhoja occurring in it. Judging from the date the sovereign under notice would appear to be one of the two Bhojas of Kanouj, whose supremacy is known to have extended to the S. W., considerably beyond the boundary of Agra, and Gwalior in their days was a part of that district. The date, however, is open to question. The first figure is peculiarly formed and may be taken for a 7, which would carry the prince to A. C. 676 (= S. 733) or within eleven years of the 2nd Bhoja of Col. Tod, with whom he may be taken to be identical.

For a long time after Bhoja, we know nothing of the history of Gwalior. According to Tieffenthaler, 71 princes of the house of Pála reigned for 860 years, at an average of 12 years per reign. If we allow at that rate, 168 years to the remaining 14 princes of his list whose reigns are not recorded, the era of the last would be brought to the beginning of the 14th century (1303)—but it appears from the inscriptions before us, that the supremacy of the Pálas had passed away in the middle of the 10th century, for we find Mahendra Chandra son of Mádhava on the throne of Gwalior in 958, and Vajradáma 20 years after him. Mahendra is noticed in an inscription, (Plate I. fig. 5,) recorded on the pedestal of a Jain figure at Suhaniya which was dedicated by him. His name, however, appears without the usual regal titles and his claim to royalty may therefore be questioned. The writing of the record is interrupted by Jain emblems. The last word is incorrectly given; it is evidently a corruption of *pratis̥hita*. It is dated Samvat 1013.

Vajradáma likewise appears on the pedestal of a Jain figure which was consecrated on the 5th of the waxing moon in the month of *Vais'ákha*,

Samvat 1034 = A. C. 977. The record (No. 6 of Col. Cunningham's plates) does not allude to the race of the sovereign, but we have that information in some detail in an inscription on an adjoining Jain temple. (Appendix, No. 7.) It is inscribed on two large slabs measuring 5'—2' by 1'—7" and 5'—6" by 1'—6" respectively, the number of lines being 21 on each. Col. Cunningham has not included this record in his plates, but he has favoured me with a facsimile of it. I have also a *Thent* Hindvi translation of it, which was prepared for the late Major Markham Kittoe. The original document is in Sanskrita, and comprises 110 stanzas in various metres, the characters being intermediate between the Kuṭila and the modern Devanāgarī. It opens with a salutation to Padmanātha and records the dedication of a temple to that divinity by a Mahārājā Mahipāla in the Samvat year 1149 = A. C. 1092. The document itself was composed or rather completed, for the whole of it could not be composed, on the 5th of the wane in the month of Ās'wina, 1150 = A. C. 1093. The composer of the deed was one Manikanṭha of the Bharadwāja gotra, and its writer Digambarārka. Its engraving needed the services of three artists, Padma son of Devaswāmi, Sinhavāja and Māhula.

The genealogy of the Rājā begins with one Kachchhapaghāta, a mighty sovereign "who was revered by innumerable princes," but of whose race and dominion, nothing seems to be known. Judging from his name "the destroyer" (ghāta) of the "Kachchhapa,"\* I imagine he was of Puar descendant and of the solar race. Col. Wilford in his essay on Vikramāditya and Śalivāhana† states that Gwalior, ancient Gopagiri, passed from the Pālas to the Puars, but he gives us no clue to the whereabouts of his authorities. According to Col. Tod‡ the descendants of Kusha son of Rāma first settled at Rhotas, whence after a time they spread under the name of Kachvahas or Kachchhapas to the West and the South. To the west they went as far as Amber where they established a flourishing principality, and checked the spread of their kinsmen, the descendants of Lava and the 36 Agnikula Rājputs. In their progress to the west, they had evidently taken Gwalior; for the 85 Pālas

\* In an inscription dated 1177, mention is made of a prince of Nalapura named Virasiṅha Deva, who was a "sun to the lilies in the lake of the happy Kachchhapaghāta lineage," and therefore of the race of the sovereign here named; the genealogy, however, not being given, it is difficult to ascertain the exact relationship he bore. *Journal American Oriental Society*, Vol. VI. p. 545.

† *Asiatic Researches*, Vol. IX. p. 513.

‡ *Rājasthān*, Vol. I. p. 336.



of that place are known to have been Kachvahas. I have no faith in the number 85, nor in the periods assigned to the different sovereigns in the list of Tieffenthaler, but it would not be too much to suppose that a long line of the Kushites did reign in Gwalior, and that our Kachchhapagháta was a conqueror of one of those Kachvahas, from which circumstance he assumed his distinctive name.

A descendant of this Kachchhapagháta was Lak'shmana. According to the panygerist of his race, he was a great king who rivalled the renowned Prithu of the Vedas by his extensive conquests; but they do not seem to have extended as far as Gwalior, for we read that his son Vajra-dáma was "the first who proclaimed his valour and his heroism by striking his kettledrum in the fortress of Gopagiri." This must have taken place a few years before 977 A. C. as we find him in that year well established in his conquered country and dedicating the Jain figure from which inscription No. 6 has been taken. Tradition has it that the Kachvahas were expelled from Gwalior by the Puars or Puriharas, and as we find Vajra-dáma the descendant of a destroyer of Kachvahas, the first who overcomes the old dynasty of the place, it will not be unreasonable to infer that he was a scion of the Puar race. Tieffenthaler supports the tradition regarding the aggression of the Puars, or *Panuvars* as he calls them, but his list of names does not correspond with that furnished by the inscriptions. According to his authority, the conquerors of the last Kushite Tejakarna was Ramdew who was after a reign of 19 years successively followed by Birmdew (7), Makherdew (13), Rettendew (11), Lavnakdew (15), Barsingdew (17), and Parmaldew (21); the seven taking up altogether a period of 103 years. It is scarcely necessary to add that these names are of little value against the positive testimony of the inscriptions under notice.

Vajra-dáma, according to our inscription, before entering into Gwalior, had subdued the king of Vindhyanagara. His son Mangala Rája, forsaking the Jainism of his father, offered his adorations to Vishnu, but he seems never to have achieved any political greatness. His successor Kírtirája, a prince of a warlike disposition, signalised himself in many a battle against his neighbours. Malwa was reduced by him to the rank of an appenage of Gwalior. In religion he was a Sivaite, and a temple to the Lord of Párvatí in the town of Siñhapániya still stands to attest the ardency of his

devotions. The family encomiast accords to his son Bhuvanapála, the usual attributes of greatness, but has nothing specific to record of him besides his having had “a son of great beauty, unsurpassed by Karna in charity and the rival of Arjuna in archery.” The name of this worthy was Devapála, who bequeathed the family sceptre to his son Padmapála. Several verses are devoted to record the glories and charities of Padma, his expedition to the South (Dekkan), his wars with demons (Rákshasas), and his dedication of temples to Brahmá, Vishṇu, Lakshmí and Nárasīṅha. He died childless, leaving his principality to Mahipála the son of his brother Suryapála. Nearly a third of the inscription is devoted to recount the glories of the last named sovereign. He rivalled all the gods and goddesses of the Hindu pantheon and surpassed every eminent object in nature to which a prurient imagination could hold him in comparison. During his reign a figure of Padmanátha—a Jain divinity—came suddenly into existence, and to it he dedicated the temple by the doorway of which the inscription under notice is recorded. He caused a range of rooms to be built around the temple for the use of the officiating priests, and cut flights of steps in the solid rock to decorate the whole. Assignments of land in the district of Brahmapura were made for the support of the temple, and a charity for feeding the poor, and a large number of jewels and gold and silver utensils were presented for the use of the idol. Among the donations, mention is made of some jewellery and utensils for the idols of Aniruddha, Bámaṇa and Vishṇu, but how this allusion to Hindu divinities came to be made in a Jain record, put up by the entrance of a Jain temple, it is difficult to divine. From Vajra-dáma to Mahipála the seven successive descendants of Lakshmaṇa oscillated between Hinduism and Jainism, but in Mahipála we find the same individual dividing his faith equally between the two adverse creeds.

The date of Vajra-dáma has been recorded at 977 A. C., that of Mahipála 1093 of the same era, giving 115 years for the seven, or an average of  $16\frac{3}{7}$  years for each reign. If the date of Vajra's accession and that of Mahipála's death could be ascertained, this average would be slightly increased; but as it is, it affords a close approximation to the average of Indian reigns ascertained by James Prinsep.

The successor of Mahipála was Bhuvanapála *alias* Manoratha, who is described as a Vaishṇava who resided at Mathurá and was a pro-



tector of Káēsthas. His reign lasted for only a few years and he was succeeded by his son Madhusudana. The date of Madhusudana's accession is not known, but on the 6th of the waxing moon of Mágha, in the year of Vikramárka 1161 = A. C. 1104, *i. e.* within twelve years after the erection of Mahipála's Jain temple, he dedicated a temple to Mahádeva and repaired a great number of the Hindu sacred edifices of Gwalior. His name and that of his father occur on a large tablet upwards of 6 feet in length on the Mahádeva temple. The record is, like the preceding, inscribed in characters intermediate between the Kuṭila and the modern Devanágri. Owing to the loss of a portion from the left of the record, it is difficult to make out the context of the whole. (Appendix No. 8.)

We have no monumental record of the successors of Madhusudana for near a century. According to Tieffenthaler, Shamsuddín, king of Delhi, wrested Gwalior from the Puars and made it over to the *Tannvariens*, a family of Rajputs who held it as governors for ten generations,\* to the time of Humáyún. But this is opposed to the statement of Ferishta who says that Kuttabuddín took the fortress in 1193 A. C. Whether the deposed king was a Kachchhapagháta of Madhusudana's line, it is difficult to ascertain; for we find on Kuttab's death a Tomara prince defying his son Aram and subsequently acknowledging fealty to his brother-in-law Altemish in 1232 A. C. One of the Tomara's built the celebrated fortress of Tomaragarh or Tarágarh, and others of the race distinguished themselves as valiant and able chieftains. They were probably the same with the Tannvariens of Tieffenthaler, but their names do not correspond with the roll of the learned Missionary. The oldest monumental names of the Tomaras are those of Sañkarendra Deva and Nága Siñha. They occur in three short records from the Teli Mandir of Gwalior, which, though undated, we judge from the style of writing to belong to the end of the 13th century. The first name occurs twice (Plate II. figs. 11 and 13), and in both places is mis-spelt, and the second is twice written in the same inscription. (Fig. 12.) The names appear without the usual regal titles.

\* The names are I. Parmaldew; II. Adharandew brother of I. (5 years); III. Biram dew son of I. (15 years); IV. Alhandew (15 years); V. Barsing dew (75 years); VI. Doungar Sen, (30 years); VII. Kirath Sing son of VI. (25 years); VIII. Kalian Sing son of VII. (28 years); IX. Mán, (50 years); X. Bikarmahschit (Vikramáditya ?) son of X. The reigns in some cases appear too long, but for vassals they are not altogether improbable.

The next name of the Tomaras which we have to notice is that of Bilanga Deva. It occurs in No. 15 of Colonel Cunningham's plates (iii) which bears date the 5th of the waxing moon in Mágha, Samvat 1467 = A. C. 1410. Tieffenthaler has a Viram dew, but he was three generations removed from Dungara. It is more probably therefore the same with his Barsing dew, who had a long reign of 75 years and was followed by Doungar Sen, for we find thirty years after Bilanga a Dungarendra Deva of whose reign there are three different inscriptions in Col. Cunningham's collection, dated respectively on Sunday the full moon, Sunday the 9th of the waxing moon, and Friday the 7th of the waxing moon, in Vais'ákha, Samvat 1497 = 1440 A. C. (Figs. 16, 17 and 18). The language used in these monuments is an obsolete patois unintelligible to me. The last of them records the dedication of a Jain figure by Kála a high priest of the congregation of Ádijina. Two of the records bear the name of the Rájá who seems to have enjoyed a long and prosperous reign. He is described as "the supreme lord of great kings" in an inscription on the foot of a figure of Mahávira\* which is date the 8th of the waxing moon in the month of Mágha, Samvat 1510 = 1453 A. C. His name likewise appears on a pillar of victory at Narwar which was erected by one of his descendants Syam Sháhi (Plate IV.), as also in the Rohtas inscription on the Kothoutiya gate of the old fort at that place.† The Narwar Pillar records the names of probably thirteen princes, but they are not all intelligible, owing partly to efacement of the engraving and partly to the document being in an obscure patois, a mixture of Sanskrita and obsolete Hindvi. They correspond, however, so closely with the names on the Rohtas monument, that I have no hesitation in taking them to refer to the same dynasty, and of correcting the reading of one by the other. The first name on the pillar is Vira Siñha, (I.) which occurs likewise at Rohtas. The second name on the pillar is illegible, and in its place at Rohtas we have Uddharana, (II.) who is followed in both records by Ganapati Deva (III.) whose successor according to the Rohtas record was Hungara Siñha (IV.) and according to the Narwar pillar Dungara Siñha, both evidently identical with the Dungarendra of the inscriptions 17, 18 and 19; the difference in the initial being due

\* In an inscription in the collection of the late Major Kittoe, No. 34, vide Appendix No. 19.

† Ante Vol. VIII. p. 693.





मां सरस्वती संकोनां मां सरा

1 श्रीआदिनाथाय नमः॥ संवत् १४७१ वर्षे वै साष ३ शुक्रे पुनर्वसु नक्षत्रे श्री गोपावल दुर्गे  
2 मङ्गाराजाधि राजराजा श्री भृगु पाति सत्तमानो श्री काष्ठा संधे माधुरा नवद्वो पुष्करा  
3 गण भद्र क श्री  
4 गण कीर्ति देव त  
5 तप देय यः कीर्ति  
6 देवा प्रतिष्ठा चार्थ  
7 श्री पंडित रघु ते पा  
8 आभाये अग्रा त वं  
9 मे मोक्ष ल गोत्रा सा॥  
10 धुरात्ता तस्प पुत्र सा  
11 धुनो पात सा भा या  
12 ना ली। पुत्र प प्र थ  
13 म सा धु के म सी। तु  
14 ती य सा धु म ह रा डा  
15 व ती य अ स रा ज च  
16 तु र्घ ध न पा ला पंच  
17 म सा धु पा ला। सा  
18 धु के म सी। नी यी  
19 नो रा टे वी पु त्र  
20 हृ द्य ष्ट पु त्र स

N<sup>o</sup> XVI.  
Colossal Figure.  
Chaitnāth.  
Suhaniya.

६॥ सि धि।  
संत  
१४६१ वर्षे  
वै स ष ष्ट दि  
१६ श्रित मो  
क्ष म द्या व  
र म प ठा क ला  
व स ष्ट ना स  
न स ग वान  
मौ डा दि अ ख  
नु ठा  
जौ ख क  
सु न नु नि ता  
मु ठ व

N<sup>o</sup> XV. Ambikā Devi. Suhaniya

७॥ सि धिः संवत् १४७१ वर्षे मार्ग शुद्धि प सो दैनं॥  
॥ म रा ना ज धि ना ज श्री वी न ग दे वः। श्री डी वि  
॥ कौ कौ म व पु क न वा भौः॥ प्र धा न न ज ना द  
॥ नः हृ द हृ द ना ५०० उ नः॥ स त्र यान ता न  
॥ वा सुः॥ मा ठ पे ति क्रा ॥ ६॥ ००

N<sup>o</sup> XVII. Great Temple. Suhaniya. on Pillars

अं वि व त्त स रा ण ॥ ६॥  
५ सि धि स व त्र १४६१  
वै सा ष ८ ग वी श्री डं ग रं  
वृ षः सा ध नी पु त्र स  
द्या ट मु क ल न ल  
प्र न रा ट वा लू ण  
क क ल पु रु द ष ॥ ६॥  
६॥ ६॥

गी प लि ग ट  
यु त ति रुः

21 धा धि प ति कौ ल॥  
22 न म्भ सा र्था व ज्ये ष्ठ  
23 श्री म र सु ती पु  
24 न म ल्लि दा स दु ती  
25 द्या यी सा धी म  
26 रा पु त्र व द्वा पा ल  
27 के म सी पु त्र दु ती  
28 य मा धु श्री भो ज  
29 रा जा ना यी दे व  
30 पु त्र पू न पा ला।  
31 ए ते षां म ध्ये श्री॥  
32 त्या दि जि न सं था  
33 धि प ति की ला स  
34 दा प्र ण म ति॥

शुक्रा का पा ला ग नु











to mislection. The follower of Dungara, according to the Rohtas record, was Kirti Siñha (V.) whose counterpart at Narwar is illegible, but there are traces of two names. Again in the Narwar pillar the successor of Kirti Siñha is Kalyána Malla who in the Rohtas record appears with the mongrel title of Kalyána Sháhi, (VI.). The next names at Rohtas are successively, Máná Sháha (VII.), Vikrama Sháha (VIII.), Ráma Sháha (IX.), Saliváhana (X.), Syáma Sháhi (XI.), and Viramitra Sena (XII.) ; of whom the 8th and the 10th appear doubtful on the Narwar Pillar. The last two were brothers and contemporary of Jálaluddín of Delhi who designated them "the unique heroes." The Rohtas inscription is dated Samvat 1688 = A. C. 1631, which gives a period of one hundred and sixty years for the eight successors of Dungarendra who reigned in 1453 A. C. How many of Dungara's successors were independent, the family chronicler sayeth not, but we find from the Mohammedan historians that the Hindus surrendered Gwalior to the forces of the Emperor Ibrahim in 1519 A. C., probably at the time of Ráma Sháhi, and in 1543, it was taken from the troops of the Emperor Humáyún by Sher Khan, his successful competitor for the empire of India. We may fairly drop, therefore, all notice of the feudatories and vassals who succeeded to the throne of Gwalior after the middle of the 16th century.

To summarise ; according to the rolls of Tieffenthaler we have three dynasties of Hindu princes in Gwalior from 275 to the time of Humáyún. The first was named Kachvaha ; it included 85 princes and an aggregate reign of 1028 years from 275 to 1303. It was followed by the Puars, seven of whom took up 103 years and then by the Tannvariens, ten of whom spread over about 250\* years. Of these the first has no mention in the records under notice. The oldest names traceable are first Toramána and then his son Pashupati of the 6th century ; next after a large gap a Lord Paramount Bhoja either in the year 676 or 876 ; then after a time we have seven reigns of a race of Puars from 977 to 1104 ; subsequently a Sankarendra and a Naga Siñha without date, then Bilanga Deva in 1410, and lastly the dynasty of Dungarendra Deva including twelve princes. The names may be thus tabulated :

|              |            |              |
|--------------|------------|--------------|
| 6th century. | Toramána,  | } suzerains. |
|              | Pashupati, |              |

\* For eight reigns Tieffenthaler gives 242 years.

A. C. 676 or 876. Bhoja Deva, suzerain.

---

„ 958. Mahendrachandra, son of Mádhava (King ?)

---

„ 978. Vajradáma, son of Lakshmana of the family of Kachchhapagháta, King.

Mangalárája.

Kírtirája.

Bhuvanapála.

Devapála.

Padmapála.

„ 1093. Mahipála.

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Bhuvanapála *alias* Munoratha.

„ 1104. Madhusudana.

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Saṅkarendra. (King ?)

---

Nágasiṅha. (King ?)

---

„ 1410. Bilanga Deva.

---

Vira Siṅha.

Uddharana Deva.

Ganapati Deva.

„ 1440—1453. Dungarendra Deva.

Kírti Siṅha.

Kalyána Malla (Sháhi).

Mána Sháhi.

Vikrama Sháhi.

Ráma Sháhi.

S'aliváhana.

Syáma Sháhi.

„ 1631. Viramitra Sena.

Coins of most of these princes are still extant, and Col. Cunningham has now in hand a plate which will afford to the readers of the Journal, specimens of a great number of them.



## APPENDIX.

*Sanskrita Inscriptions alluded to above.*

No. 1. Already translated and published, (ante Vol. XXX. p. 275.)

No. 2. Rock Tablet near Lakshman Puar. Not intelligible.

No. 3. Rock Pilaster, Gwalior.

श्रीचन्द्रशेखरस्यविण \*

र्वस्यतिसीधेर्को \* \* \*

No. 4. Inside rock-cut temple, Fort of Gwalior.

Transcript.

- (१) ॐ नमो विष्णवे । सम्बत्सरशतेषु नवसु त्रयस्त्रिंशदधिकषु\* माघ-  
शुक्लद्वितीयाया सं ६३३† माघसुदि २ मद्येह श्रीगोपगिरी-  
श्वरमिह
- (२) परमेश्वरश्रीभोजदेवतदधिकृतकोटपालमल्लबलाधिकृततुर्कस्था-  
नाधिकृतश्रेष्ठिवव्वियाकइच्छुवाकसार्थवाहप्रमुखसव्विया-
- (३) कानां पारे । समस्तस्थाने नकइल्लभट्टसुतरल्लकारितवृश्चिका-  
लानदीपरकुले रुद्ररुद्राणोपूष्णाशादिनवदुर्गायतना-
- (४) यस्वभुज्यमावूयपल्लिकाग्रामप्रतिवद्धभूमिगुणं दैर्घ्येण पारमेश्व-  
रीयहस्तशतद्वयसप्तत्यधिकं हस्त २७० विस्तारेण
- (५) हस्तशतमेकं सप्ताशीत्यधिकं हस्त १८७ पुष्पवाटिकार्थं पुण्येहनि  
प्रदत्तं तथाऽनेनैव स्थानेनास्मिन्नेव सम्बत्सरे.‡
- (६) फाल्गुनबज्जलपक्षप्रतिपदि श्रीभोजदेवप्रतोत्यवतारे मल्लेनैव  
कारितः § वाइल्लभट्टश्चास्योदपानधिष्ण्यायतनाय तथो-
- (७) परिलिखितनवदुर्गायतनाय च पूजासंस्कारार्थं स्वभुज्यमानजय-  
पुराकग्रामे व्याघ्रकर्णिकाभिधान[हानमूलाकयं॥]
- (८) सद्गदाकसुतदल्लकवाहितक्षेत्रं तथास्यैव क्षेत्रस्योत्तरतः क्षत्रि-  
यदेववर्म्मसुतमेसारकवाहितक्षेत्रं च ययोर्गोपगिरीयमा-
- (९) प्येनावापो यवानां द्रोण्य एकादश तयोर्द्वयोरपि क्षेत्रयोराघाटः  
पूर्वेण नइदाकवाहितक्षेत्रं दक्षिणेन पाहादन

\* अधिकेषु recte.

† The first figure may be 7, Vide ante p. 399.

‡ The word संवत्सर here, at the beginning of the record and in the 11th line, is written incorrectly. The v has been made to coalesce with the preceding anuswāra in the same way as if it were a b.

§ कारितं recte.

|| The letters within the brackets are unintelligible.

- (१०) पश्चिमेन दल्लकवाहितक्षेत्रे पादपाः ततोमम्माकवाहितक्षेत्रं  
उत्तराभिमुखवाहकः \*क्षेत्रं परिधिस्तु गतः उत्तरेण वर्त्म-
- (११) लघुपाट्टाटिका च एवं चतुराघाटविशुद्धं क्षेत्रद्वयं पुण्येहनि प्र-  
दत्तं । तथास्मिन्नेव सम्बत्सरे फाल्गुनवज्जलपक्षनवम्यां-
- (१२) उपरिलिखितदेवकुलाभ्यां द्वाभ्यामपि दीयते त्मार्थं† श्रीसर्व-  
श्वरपुरनिवासितेलिकमहन्तकभोच्चाकसुतसर्वस्वाक तथा मा-  
धव-
- (१३) सुत-ज्यशक्ति तथा शिवधरिसुत-साज्जल तथा गग्गाकसुत-गग्गी-  
क । तथा श्रीवत्सस्वामिपुरनिवासि तेलिकमह-
- (१४) न्तककुण्ठकसुत सिंघाक तथा वल्लवसुत-खाहदाक तथा चच्चि-  
काहट्टिका निंवादित्यहट्टिकयोर्निवासि तेलिकम-
- (१५) हन्तक देउवाकसुत-जज्जट तथा वच्चिल्लाकसुत गाग्गाक तथा  
ददकसुत जम्बक तथा सद्रटासुत जम्बहरि । एवमादि-
- (१६) समस्ततेलिकश्रेण्या प्रतिकोल्हुकं मासि मासि शुक्लनवम्यां शुक्ल-  
नवम्यां तैलपलिका पलिका दातव्येत्यक्षयनी
- (१७) मया प्रदत्ता ॥ तथाद्यैवामूभ्यामेव देवकुलाभ्यां श्रीगोपगिरित-  
लोपरिनिवासिमालिकमहरगादुल्लसुत टिक्काक
- (१८) तथा देदकसुतज्यसेक तथा वज्जलाकसुत सिद्धक तथा जम्बाक-  
सुत सहदाक तथा दन्तिसुत दुर्गधरि तथा ननमाकेय-
- (१९) — मक तथा — — — — — एवमादिसमस्तमा-  
लिकश्रेण्यापूजार्थं — — — — — कालापयिकहभट्टसुयामा—
- (२०) ल्यापाण — — पण — — — — प्रतिदिनं दातव्येत्यक्ष-  
यनामिका प्रदत्ता । एतदुपरिलिखित— — — — —
- (२१) तस्यानादिभिस्तदक्षयायाचन्द्रार्कक्षितिकालं प्रदत्तं परि— —  
— कैरपिनकर्त्तव्या — तथा, स्वदत्तांपरदत्तां वा यो
- २२) हरेतवसुन्धरां । सविष्ठायांकृमिभूत्वा बन्धुभिस्सहमोदते । वज्ज-  
भिर्वसुधाभुक्ता राजभिस्सगरादिभिः । यस्य यस्य
- (२३) यदा भूमिस्तस्य तस्य तदा फलम् ॥ \* ॥
- (२४) — — — — —
- (२५) — — — — —

\* The visarga after वाहकः is wrong.

† त्मार्थं for आत्मार्यं ।



## Translation.

Om ? salutation to Vishnu ! In the Samvat year nine hundred plus thirty-three, on the 2nd day\* of the waxing moon, in Mágha (in figures) S 933, Mágha 2 Sudi.

To-day, this to the auspicious Lord of Gopagiri (Gapagirisvara)\*\* under the supremacy of the Lord paramount S'ri Bhoja Deva, and subject to the rule of Koṭṭa-pála Malla, within the jurisdiction of Turkasthána, beyond the cantons (sabbiyákas)† Sreshṭhi Babbiyáka,‡ I-chehhuváka, Sárthaváha, and others, on the opposite bank of the Vrischikálá river (canal ?) which was made (excavated)§ by Ralla son of Nakailla Bhaṭṭa, within the village of Abuya|| Pallika, which is in my possession, a spot of ground, measuring in length 270 cubits of the Lord paramount (Párameswara)¶ and in breadth 187, is presented on a fortunate day for the purpose of a flower garden for the temple of Rudra, Rudrání, Pushnásá &c. as also of the nine Durgás. Further along with this place, on the 1st day of the waxing moon, in the month of Phálguna of the current year, on the side of S'ri Bhoja Deva Highway, made by Malla\* as also Bailla Bhaṭṭa, within the village of Jayapuráka, which is in my possession, the field which passes in the name† of Dallaka son of Sadgadáka\*\*\*\*\*‡ and named Vyághrakarṇiká, as also the field which passes in the name of Mesáraka the son

\* The case affix of *dvitīyāyām* is carried over the date in figures to the beginning of the word "Adyeḥa."

† A non-sanskrita term apparently something like our Bengal *Zillah* or *Pargunnah*. A district to the north-west of Gwalior has the name of Sabalyook.

‡ Sreshṭhi at first sight would appear to be the title of a banker, the Sett of our days, but here it is so placed that grammatically it cannot but stand for the name of a place.

§ A river cannot be said to have been made by anybody, and yet the word *Rallakárita* "made by Ralla" is so placed that it cannot but be taken as a predicate of the river, the name of which immediately follows it; thus *Rallakárita vrischikálá nadípara-kule*. I take the word for a canal which was probably the origin of the *Subarnarikshá* or the nullá at the foot of the hills.

|| The *bs* and *vs* are written alike, I am not certain therefore whether the name should be Abuya or Avuya.

¶ This evidently refers to Bhoja, it may therefore be assumed that he had a special standard of linear measure.

\* The subject and its predicate do not agree; the former is in the locative case, and the latter *mallenaivakárita* "made by Malla" is joined to the following word Bailla Bhaṭṭa by the conjunction *cha*. *Kárita* was probably written *Kárite* which would make it correspond with *avatáre*, but I know not what to make of the nominative Bailla Bhaṭṭa.

† The word is *váḥita*, which I believe is equivalent to the modern form of the "jot (holding) of so and so."

‡ Here six syllables are unintelligible. The letters appear to be distinct, but they convey no sense.

of Kshatriya Devavarmá, which is situated to the north of the field first mentioned, and which two together require for cultivation eleven *dronis*\* of barley according to the measure of Gapagiri, and have the following for their boundary viz. To the east the field which passes in the name of Naidáka to the south Páhádanna,† to the west the trees in the field which passes in the name of Dallaka, as also the field which passes in the name of Mammáka. To the north the field of Váhaka and a road across, as also Laghupáhátiká;—these two fields thus bounded on the four sides, are presented on an auspicious day for the purpose of establishing a drinking fountain and a place of rest, as also for supplying offerings for use in the aforesaid temple of nine Durgás. Further on the 9th day of the waxing moon in the month of Phálguna of the current year, I ordained that for the two classes of gods aforesaid and for (the good of) my soul, all the oil merchants beginning with the following should, month by month on the 9th day of every waxing moon, allow for every oil press‡ a palá§ full of oil.

(The names are) Sarveswara son of Bhoichháka the head oil merchant of Sri Sarveswara-pura! next Jayasacti son of Mádhava, next Sáhulla son of Sivadhari, next Gaggika son of Gaggáka, next Singháka son of Kunuka the head oil merchant of S'ri Vatsaswámipura, next Khahadáka son of Ballava, next Jajjāta son of Deūváka the head oil merchant of Chachchiká and Nimbáditya market places, Gaggáka son of Bachchhilláka, next Jambaka son of Daddraka, next Jambahari son of Sadratá\*\*\*\*\*.

(A similar ordination is made for the daily supply of flowers, &c. and the deed closes with the usual imprecations against the reemption of grants by the successors of the donor, but this part of the deed is so full of lacunæ that it cannot be translated.)

No. 5. From the Pedestal of a Jain Figure at Suhaniya.

संवत् १०१३ माघवसुतेन महिन्द्रचन्द्रकेनकभा(खि?)दिता

\* A common *droni* measures 128 seers, or 256lb. avoirdupois; the Gopagri standard was probably different.

† What this Páhádanna is, I cannot make out.

‡ The word is *Koluka*, which I believe is the archetype of the modern Hindi *Kolu* "an oil press;" it does not occur in any Sanskrit dictionary.

§ The weight of a *palá* differs from 3 tolás 3 máshás and 8 raties to eight tolás. A *palá* of gold or silver weighs 4 *Kárs'hás* or tolás.



No. 6. Also from the Pedestal of a Jain Figure at Suhaniya.

सम्बतः । १०३४ श्रीवज्रदाममहाराजाधिराज वज्रसाखवदिपा-  
चमि \* \* \*

On the 5th of the wane in the month of Vais'ákha, Samvat 1034.  
Mahárájá-dhirája Vajradáma (rest not legible).

No. 7. From the Great Jain Temple in the Fort of Gwalior.

*Transcript of the left half.*

- (1) ॐ नमः पद्मनाथाय । हर्षोत्फुल्लविलोचनैर्दिशि दिशि प्रो-  
द्गीयमानं जनैर्मैदिन्यां विततन्ततोहरिहरब्रह्मास्पदानि क्रमात् ।  
श्वेतीकृत्य यदात्मना परिणतं श्रीपद्मभूभृद्यशः पायादेष जग-  
न्ति निर्मलवपुः श्वेतानि रुद्रश्चिरम् ॥ (१) ॥ मौलिन्यस्तमहानी-  
लशकलः पातु वोहरिः । दर्शयन्निव केशस्थनवजीमूतकर्ण-  
काम् ॥ (२) ॥ मुक्ताशैलच्छलेन क्षितिति-
- (2) लकयशोराशिना निर्मितोऽयन्देवः पायादुषायाः पतिरति-  
धवलखच्छकान्तिर्जगन्ति । मन्वानः सर्वथैव त्रिभुवनविदितं  
श्यामतापङ्गवं यः शङ्के स्वं वर्णचिह्नं मुकुटतटमिलनीलकान्त्या  
विभर्त्ति ॥ (३) ॥ इदं मौलिन्यस्तं न भवति महानीलशकलं नमुक्ता-  
शैलेन स्फुरति घटितश्चैष
- (3) भगवान् । उषाकर्षोत्तंसीकरणसुभगं नीलनलिनं वहत्यद्याप्य-  
स्याश्चिरविरहपाण्डूकृततनुः ॥ (४) ॥ आसीदीर्यलघूकृतेन्द्रतनयो  
निःशेषभूमीभृतां वन्द्यः कच्छपघातवंशतिलकः क्षोणीप्रतिर्ल-  
क्ष्यः । यः कोदण्डधरः प्रजाहितकरश्चक्रे स्वचित्तानुगाङ्गामेकः  
पृथुवत्पृथूनपिहठादुत्पाद्य पृथ्वीभृतः ॥ (५) ॥ तस्माद्वज्रधरोपमः  
क्षिति-
- (4) पतिः श्रीवज्रदामाभवद्दुर्वारोर्जितबाहुदण्डविजिते गोपात्रिदु-  
र्गे युवा । निर्याजम्परिभूय वैरिनगराधीशप्रतापोदयं यदीरव्र-  
तसूचकः समभवत्प्रोद्घोषणाडिडिमः ॥ (६) ॥ न तुलितः किलकेनचि-  
दप्यभूज्जगति भूमिभृतेतिकुतूहलात् । तुलयतिस्म तुलापुरुषः  
स्वयं खमिह वर्षा विशुद्धाहरण्यैः ॥ (७) ॥ ततोऽरिपुध्वान्तसहस्र-  
धामा नृपोभव-
- (5) न्मङ्गलराजनामा । यज्ञेश्वरैकप्रणतिप्रभावान्महेश्वराणाम्प्रणतः  
सहस्रैः ॥ (८) ॥ श्रीकीर्तिराजेनृपतिस्ततोभूद्यस्य प्रयाणेषु चमू-  
समुत्थैः । धूलोवितानैः सममेव चित्रं मित्रस्य वैवर्ण्यमभूद्विषस्य ॥

॥ (६) ॥ किं ब्रूमास्य कथामृतं नरपतेरेतेनशौर्याब्धिना धत्ते मा-  
लवभूमिपस्य समरे सङ्ग्रामतीतोर्जितः । यस्मिन् रङ्गमुपागते  
दिशि दिशि चासा-

(6) त्कराग्रच्युतैर्ग्रामीणाः खगृहाणि कुन्दनिकरैः सञ्छादयाञ्चक्रिरे ॥  
॥ (१०) ॥ अद्भुतः सिंहपानीयनगरे येन कारितः । कीर्त्तिस्तम्भ-  
इवाभाति प्रासादः पार्वतीपतेः ॥ (११) ॥ तस्मादजायतमहामति-  
मूलदेवः पृथ्वीपतिर्भुवनपाल इति प्रसिद्धः । श्रीनन्ददण्डगद-  
निन्दितचक्रवर्त्तिचिह्नैरलंकृततनुर्मनुतुल्यकीर्त्तिः ॥ (१२) ॥ यस्य  
ध्वस्तारिभूपालां सर्वाम्पालयतः

(7) प्रभोः । भुवन्त्रैलोक्यमल्लस्य निःसपत्नमभूज्जगत् ॥ (१३) ॥ पत्नी देव-  
व्रता तस्य हरेर्लक्ष्मीरिवाभवत् । तस्यां श्रीदेवपालोभूतनयस्तस्य  
भूपतेः । दानेन कर्णमजयत्पार्थं कोदण्डविद्यया । धर्मराजञ्च  
सत्येन स युवा विनयाश्रयः ॥ (१४) ॥ सूनुस्तस्य विशुद्धबुद्धिविभवः  
पुण्यैः प्रजानामभून्मान्धातेव स चक्रवर्त्तितिलकः श्रीपद्मपालः  
प्रभुः । यत्त्वाम्येपिक-

(8) रप्रवृत्तिरपरस्येतीव यश्चिन्तयन्दिग्यात्रासु मुहुःखरांशुमरुणं सां-  
द्रैश्चमूरेणुभिः ॥ (१५) ॥ दृत्वान्याः स्ववशे दिशः क्रमवशात्स क्षापति-  
र्दक्षिणानुत्क्षिप्ताचलसन्निभानविरत — — — वाजिब्रजैः ।  
उद्धूताग्निततःप — — — — — ः संप्रेक्ष्यरेणूत्करान्  
भूयोप्युद्धूटसेतुबन्धनधिया चस्यन्ति — — — ॥ (१६) ॥ तस्येन्दु-  
द्युतिसुन्दरेण यशसा नाके सुराणांगणे सौवर्ण्यभ्रमशीलखण्डन-

(9) भयादप्राप्नुवत्यः प्रियान् । नूनं शक्रपुरःसुरासुरबधूसङ्घाः श्रिये  
साम्प्रतं — — — — — यन्ति ये प्रथमतः सर्वा  
वपुःसंश्रिते ॥ कैर्दृप्ता — — — — —  
— — — — — पादपां गावः कामदुघा — — — — —  
— — — — — कैश्चिन्तितार्थप्रदाः । पूर्णाःक  
स्य मनोरथा इह न कैः — — — — — मुना पूरिता  
वीरो यानि तदस्ति तद्गुणवतः कस्यद्रुमादीन्यपि । श्रुत्वा न पद्म  
नृपतिंप-

(10) रिरक्षितारं प्राप्तोदयोपि यदसौ वत नम्रभावः ।  
योद्यापि — — — — — तनुर्विपिनेष्यशो — — — — —  
— — — — — ॥ भ्रमः कुलाल-  
चक्रे च लाभःपुण्यार्जनेषु च । काठिन्यं



कुम्भेषु क — — — — शासविमर्दिनीम् ॥ असम्मतो  
— — — — — पोडासाधुर्ननिस्त्रिंसपरि  
— तोपि । इ — — — ललगेन धनुर्नचासिं तथापि  
यावैरिगणं जिगाय । सद्य—

(11) — — — — — पाधिप  
शिरोमणिंभि — — — — । लोकानुरागयशसापि  
— — — — व्रतापं विस्तारयां यदसि — — — — ॥  
वलयानीव नारीणां हिमानीव नभश्चियः ।

— — — — —  
सविमृश्य नदीपूरचत्वरे सम्पदायुषः । पूर्वधर्मे मतिं चक्रे  
जिह्वचुरनयोः फलम् ॥ प्रजा — — त्वते

(12) न क्षितितिलकभूतं नभवनं — — — — —  
— — — — — कारितमदः । — — — — —  
— — — — — मिव गिरा यस्य शिखरं समारूढसिंहे  
मृगमिव नृ — — मशितुम् ॥ — — — — —  
सञ्च — — वरशिखरस्यर्दिनोहिममण्ड — — — त्याव  
तीयं शशिकरधवला वैजयन्ती पतन्ती । निर्व्वातं भाति भूति-  
च्छुरितनिजतनोर्देवदेवस्य शम्भोः स्वर्गादुक्तेव पिङ्गस्फुटवि-

(13) कटजटाजूटमध्यं विगृह्णी ॥ तदेतद्रक्षाणं सइह भविता पङ्क-  
जभुवः पुनर्वयम्बोटास्मो वयमिह — — वियति — — । — — —  
— तदिदमुररीकृत्य सकलं ध्रुवं संसेवन्ते हरिपदन — — —  
तसमी ॥ — — — — — कनकाचलः शुभ  
विद्यावन्तःस्थितः श्रीपतिर्विभाणो द्विजसत्तमानुदधिजावासो  
नृसिंहान्वितः । निर्माता खट्वतः समस्तविवुधैर्लब्धप्रतिष्ठैरयं  
प्राप्नोदञ्च

(14) धरातलेसममहो कल्पं हरेःकल्पताम् । — — — — —  
द्विजपुंगवेषु प्रतिष्ठितेष्वयसु पद्मपालः । युवैवदैवप्रतिकूलभावा  
— — — — — वभूव ॥ तस्य भ्राता नृपतिरभव-  
त्सूर्यपालस्य सूनुः श्रीगोपाकैः प्रकृतनिलयः श्रीमहीपालदेवः ।  
यम्प्राप्यैव प्रथितयशसन्तावभूतां सनाथौ सोयं त्यागो हरिर-  
विसुताभावदुष्टो चिरेण । स्तुतिङ्कुर्वन्नमात्यानां विप्रा-

(15) णांसन्तपस्थितिम् । प्रलयं विदिषामासीद्भ्रूलोपेन्द्रहरात्मकः —

यत्र धामनिधौ राज्ञि पालयत्यवनीतलम् ॥ ———  
 ———मुदहन्ति शिरसः खलु राजहंसाः सृष्टास्त्वया पुनरिमाः  
 समयावसन्नाः । नाथ प्रजाः सुमनसां प्रथमो— —सित्वं सिद्ध-  
 वीररसता

- (16) मरसोद्भवस्य ॥ लक्ष्मीपतिस्त्वमसि पङ्कजचक्रचिह्नं पाणिद्वयं  
 वहसि भूप भुवं विभार्षि । श्यामं वपुः प्रथयसि स्थितिहेतु-  
 रेकस्त्वं कोपि नीतिविजितो— — — — —  
 सम्पालयस्यनिष्मर्थिजनस्य कायं रामः श्रिया त्वमसि नाथ मु  
 — — । सङ्कर्षणस्त्वमसिविद्विषदायुशस्त्वं त्वं कोसि सच्चरितहाल  
 हलायुधस्य ॥ ख्यातारति — — — — रूपं तवातिश —
- (17) यविस्त्रयकारि देव । त्वं मीनसिद्धपुरुषोत्तमसम्भवोसि कस्त्वं  
 क्षितीश्वरशंकरसूदनस्य ॥ भूभृत्सुतापतिरसि द्विषतां पुराणि  
 भेत्तात्वमीश — — — — — म् । भूतिं  
 दधास्यमलचन्द्रविभूषिताङ्गः कस्त्वं सदम्बुजदिवाकरशङ्करस्य ॥  
 त्वं तेजसा शिखिनमिद्धमधः करोषि शक्तिं दधासि — — —  
 — — — — — । त्वन्तारकं रिपुबल
- (18) — बलान्निहंसि कस्त्वं नवीनलनीलमलब्धजन्मा ॥ त्वं वज्रभृ-  
 त्वमसि पक्षभिदप्यशेषं भूमीभृतां विबुधबन्धगुरुप्रियोसि ।  
 — — — — दुर्गाचरणोसि कोसि त्वं भीमसाहससहस्रवि-  
 लोचनस्य । ख्यातं तवेशबद्धपुण्यजनाधिपत्यं कान्तालकावलि-  
 भिराप्ततमैः सुगुप्ता ॥ त्वामामनन्ति परमेश्वरबद्धसख्यं त्वं कोसि  
 सद्गुणनिधानधरा
- (19) — धिपस्य । तेजोनिधिस्त्वमसि भूमिभृतः समग्राः क्रान्ताः करैः  
 प्रथतमुग्रतरैस्तवेश । प्राप्नोदयः सततमर्थिजनस्य कोसि त्वं क-  
 ल्पभूधर सरोरुहबान्धवस्य ॥ आनन्दोसि जनतानयनो-  
 त्पलानां माप्यायिताखिलजनः करमार्दवेन । त्वं शश्वदीश्वरशि-  
 रस्तलदत्तपादस्त्वं कोसि मर्त्यभुवनेशनिशाकरस्य ॥ त्वामंश-  
 मीश नि-
- (20) गदन्ति मधुद्विषोमी श्यामाभिरामतनुरस्यमलप्रबोधः पुण्यं —  
 — रतमिदं विहितं त्वयैव त्वं कोसि सत्यधनसत्यवतीसुतस्य ।  
 — — — — न्ति सुरसिन्धुरियं समुद्रप्रान्तन्वयोन्नतिमसौ गमि-  
 तः स्ववंशः । पूर्वं प्रवित्रवनके विहिताश्वकोसि वंशस्थलब्धपर-



ता — भगीरथस्य ॥ एतत्त्वया कृतमताडकमासुधिरु' व्याप्ता  
महीह

- (21) — — रीश मनोजवैस्ते । पुण्यावतारकरणक्षतदुर्दशास्यस्त्वं  
कोसि हन्त रिपुलाघवराघवस्त्वम् ॥ धर्मप्रसूस्त्वमसि सत्यधर-  
स्त्वमेकस्त्वं वासुदेवचरणार्चनदत्तचित्तः । त्वं कोसि विप्रजनसे-  
वितशेषभूतिः सङ्ग्रामनिष्ठुरयुधिष्ठिरपार्थिवस्य ॥ त्वं भूरिकु-  
ञ्जरवलो भुवनैकमल्ल — — — भूषिततनुर्नृपपावनोसि । प्रच्छन्न

*Transcript of the right half.*

- (1) — — — — — : कस्त्वं कवीन्द्रकृतमाद —  
कादरस्य । पक्वस्त्वमीश भुवि धर्मभृतां वरिष्ठः सखामिकारिगु-  
णदर्पहरस्त्वमाजौ । त्वं सर्व्वराजपुतनाविजयाप्तकीर्त्तिस्त्वं कोसि  
सुन्दरपुरन्दरनन्दनस्य ॥ दुर्योधनारिवलदर्पहृतस्त्ववेशयन्तः परा-  
र्जनयशःप्रसरेनिरोद्धुम् । त्वं कोसि भूजनित — — —  
कर्त्तनविकर्त्तनसम्भवस्य ।
- (2) — — — — यस्त्वमसि कर्म गभीरतायास्त्वंपासि पार्थस-  
मभूमिभृतः प्रविष्टान् । अन्तःस्थितस्तव हरिः सततं नरेश कस्त्वं  
विदीर्णरिपुजागरसागरस्य ॥ — — — क्रमसमागतसत्त्व-  
वृत्तिस्त्वं राजकुञ्जरशिरःप्रवितोर्णपादः । दीप्तारिभास्करतिर-  
स्कृत्तिसिंहिकाभूः कस्त्वं महीपतिमृगाङ्गभृगाधिपस्य । दानं द-  
दासि विकटो वत वंशशोभस्त्वं दन्तपालिकरवा
- (3) लहृतारिदर्पःक्षोणीभृतो जयसि तुच्छतया नरेन्द्र त्वं कोसिवैरि-  
वलदारणवारणस्य ॥ सद्गम्यस्त्वमसि मित्रकृतप्रमोदस्त्वं राज-  
हंससमलङ्कृतपादमूलः । खामिन्नधःकृतजडोसि जनाभिरामः  
कस्त्वं स्मिताब्जमुखपङ्कजपङ्कजस्य ॥ सत्यत्रभूषिततनुः सुविशुद्ध-  
कोशस्त्वं चन्द्रकीर्त्तिसमलङ्कृतकान्तमूर्त्तिःख्यातं तवैव कविवर्ण  
— — — — — व्व वु हिक — —
- (4) समरभैरवकैरवस्य ॥ त्वं पश्यतां हरसि देव मनांसि सश्वन्मङ्ग-  
ल्यभूस्त्वमसि निर्मलताभिरामः । कोसि प्रसीद बज्रसद्गुणरत्नयो-  
निस्त्वं कच्छपारिकुलभूषणभूषणस्य ॥ धात्रा परोपकरणाय विस्त-  
यकायः सच्छायजन्मसमलङ्कृततुङ्गगोत्र । ब्रूहि — — मवनीश्व-  
रवन्दनीयस्त्वं कोसि सूर्यनृपनन्दनचन्दनस्य ॥ — — — —  
नत्वाशु शुद्धहृदय प्रथितो





द्विजेभ्य— — — — —

(12) गतो योगीश्वरांगोद्भवः ख्यातः सूरिसलक्ष्मणः क्षितिपतेः सर्वत्र विश्वासभूः । आधारेविनयस्य शीलभवनं भूमिः श्रुतस्याकरः स्वाध्यायस्य — क क वसतिः

(13) ह्योपाले नटो विप्रास्तस्मिन् ग्रामे प्रतिष्ठिताः । तेषां नामानि लिखन्ते विसूरः शासनोदितः ॥ देवलब्धिः सुधीराख्यस्ततः श्री-धरदीक्षितः ॥

(14) — — — — रामेश्वरो द्विजवरस्तथा दामोदरो द्विजः । अष्टादशैते विप्राश्च — — — — द्विजः । पादोनपदिका — — — — शेकौसुरार्चकौ । द्वावर्द्धपदिनावेष विप्राणां सङ्ग्रहः कृतः । — — — — दर्द्धपदं नृपः । विधाय — — — — कायस्य सूरये ॥ देवाय दत्तः सौवर्ण्यराज्ञा दत्तैः समाचिरम् । — — — — हरिणमणिमयं भूप-

(15) — — — — कं ददौ । रत्नैर्विचित्रं निष्कञ्च निष्क — — — — :सभूपतिः ॥ प्रा — — — — केयूरयुगलं रत्नैर्वज्रभिराचितम् । कङ्कणानां चतुष्कञ्च महार्हमणिभूषितम् । — — — — द्वितीय मनि — — — — स्य सौवर्ण्यं केवलं यथा । कङ्कणानाञ्च-तुष्कञ्च नीलपट्टद्वयं तथा । — — — — लैः पञ्चभिर्युता । — — — — धारापात्रञ्च कां

(16) — — — — चतुष्टयम् । सुवर्णाण्डत्रयं देवपरिवारविभूषणम् । — — — — परिहेमाजमातपत्रीकृतं विभोः ॥ निवेश्य ताम्रपट्टे च तन्मयेनैवम — — — — प्रतिमा नित्यं मणि — — — — राजती ॥ प्रतिमा — — — — का द्वितीया — — — — द्युती । राज — — — — मयोचान्या — — — — । ताः प्रयत्नेन ति-स्रोपि पूज्यते — — — — वेष्मनि । तत्र ताम्रमयं देवं दीपार्थं मण्डिकाकृतम् ।

(17) — — — — क । ताम्रार्घपात्रद्वितयं तथा दत्तं महीभुजा । सधूपदहनाः सप्त घण्टाश्च — — — — । दत्ताः शङ्खाश्च सप्तैव ताम्र-प्राचीचतुष्टयम् । सकांस्यभाजनं प्रादानृपतिः — — — — चामरं दण्ड — — — — दृष्टुञ्चतुष्टयं ताम्रमयं ताम्रा — — — — । दत्ताश्च दशतन्मयाः ॥ — — — — देवोपकरणद्रव्याणां सङ्ग्रहः कृतः ।

(18) — — — — वापीकूपतडागादि — — — — नानावनेषु च ।

दशमांशं तथाविंशत्यूर्ध्वं सर्वत्र मण्डले । ददौ राजा नि — —  
 यते सर्वं प्रवर्तते । अयं देवालयो नाम — — स्फटिकामल  
 — — — — — भारद्वाजेन सीमांसान्यायसंस्कृतबुद्धिना ।  
 कवीन्द्ररामपौत्रेण गोविन्दकविसूनुना । कविता मणिकर्णेन  
 सुभाषितसरस्वता । प्रशस्ति

(19) — — — — लङ्केश्वरवान् द्वितीयां विभ्रत्सुहृत्तां मणिकण्ठ-  
 स्वरैः ।

पञ्चासे चाश्विने मासे कृष्णपक्षे नृपाज्ञया । रचिता मणिकर्णेन  
 प्रशस्तिरियमुज्ज्वला ॥ अङ्कतोपि ११५० ॥ आश्विनबज्जलपञ्च

(20) — — — — — खिलां महीम् । यस्य गीर्वाणमन्त्री च मन्त्री गौरो भव — — ।  
 प्रशस्तिरियमुत्कीर्णा सदृणा पद्मशिल्पिना ॥

(21) \* \* \* \* \*

No. 8. From a Sivite Temple in the Fort of Gwalior.

*Transcript.*

(१) — — — — —

(२) ख्याम् । तमन्वक्प्रतापावनम्भारिमौलिखगभ्यर्चनीयाङ्घ्रिपीठोप-  
 कण्ठः । अधिष्ठायगोपालिकैराधिपत्ये वभौ भूमिपालो महीपाल-  
 देवः ॥ प्रतीपाखिलक्षत्रियक्षोददक्षो य एकातपत्रां धरित्रीं व्य-  
 धत्त । दिशादन्तिकुम्भस्थलीशङ्खभूषां स्वकीर्त्तिन्त्रिलोकोत्तटान्ते  
 न्यधत्त ॥ वैवस्वतकरदण्डाश्लिष्टे पा

(३) कुमुदवनविकासकृद्राजा ॥ पादानिह क्षितिभृतां दधतः शिरःसु  
 दोषापसारणपटोः सदिनश्रियश्च । धामाधिकस्य तरणेरिव दुः-  
 सहृत्वं यस्यावहृद्दिशि दिशि प्रसरत्प्रतापः ॥ उदारसमरारम्भो  
 दूरेसुकुरुते रिपून् । यस्य प्रयाणवार्त्तापि पलायनपरायणान् ॥\*॥  
 भवस्य भालान्धकवर्त्मभेदं रुण्ड्यपर्णालकवू—

(४) :सदा गच्छतु कालयज्वा ॥ श्रीमान्वभूव मयुराभिजनो विमायः का-  
 यस्थवंशविपिनान्बुधरः प्रहृष्टाः । शिष्टास्त्रिवर्गपथगामि मनोर-  
 थस्य यस्याध्यगोषत मनोरथ इत्यभिख्याम् ॥ भुवनपालनृपद्रवि-  
 ण्ययागमनियोगनिबन्धनलेखिनः । गणिततत्त्वसमस्तलिपिज्ञता  
 गुणकृतस्तवनेस्य गुरुर्लघुः ॥ कान्ताङ्गका—



- (५) ललिताङ्गयष्टिः । स्पष्टीकृतात्मकुलशीलकलानुभावा भावानु-  
रक्तिपरमास्यरमेव विष्णोः ॥ यो मानिनां कैरवकुक्षलानां प्रक्रा \*  
\* तमधादिवेन्दुः । हेमानि चन्द्रश्चतुरर्णवाच्च भ्रान्तोरुकीर्त्तिस्तन-  
योस्य जज्ञे ॥ स्मरारिपूर्वामरमूर्त्तिसुन्दरो दरास्मवेस्मप्रकरा-  
र्पितध्वजैः । मरुद्रुतैस्तर्जयदङ्गिनामघान्यचीकरत्कीर्त्तनमा—
- (६) विधानेषु यतस्तदीया । शुचिस्मितोस्त्रासितहारकान्तिस्ततो ज-  
नैराप्तमतिर्निरूचे ॥ त्रिजगद्विततात्मयशोविसदीकृतदिक् स  
तयो स्तनयोभिजनोज्वलसर्वनिजान्वयजाञ्जरविः । मधुसूदन  
इत्यजनिष्ठ विशिष्टगुणप्रणयः स्तुतयो गुरुदारगुणं प्रतिसंप्रति  
यं विदुषाम् ॥ यशोविकासो मधुसूदनस्य भास्वन्मयूखा  
(७) चूर्यमाणः क्षयमापदिन्दुः ॥ येन त्रिलोकजनताण्यशुद्धिहेतुर्द्ध-  
र्मापि निर्मलतमः क्रियतेस्म शस्वत् । तस्यावदातचरिताद्भुतव-  
र्त्सनायामोजोविजृम्भितमहो यदिशारदायाः ॥ कराञ्जलिपुटो-  
द्धृतं जलमिवैष शम्बत्सुधीः समग्रजयदंगिनां प्रगलदायुरालोच-  
यन् । श्रुतैधितशमाम्बुसंशमितरागपात्रार्पि—
- (८) —॥ आशासु यः शिष्टजगज्जनस्य श्रियं न्यधादात्मकरावकृष्टां ।  
जना यदीयावरजं तमाशाचंद्रं जगुः प्रीतगुरुं सुवृत्तं ॥ पतितप्र-  
पतत्प्रपतिष्यदमर्त्यगृहोद्धरणैः स्वभुजार्जितशुद्धधनव्ययवृंहितपु-  
ण्यनिधिः । यतिविप्रवरार्त्तविपन्नजनार्त्तिहरो भवनं भवनाशक-  
रस्य हरस्य स कारयतिस्म कृती ॥ विद्वद्बृन्दाम्बुजवनरविः श्रीज—
- (९) — निर्गृंथनाथः । यः सद्भाषाविततकविताकेतुहर्म्यं कलानां पूर्वा-  
मेतामकृत स मुनिः श्रीयशोदेवनामा ॥ मनोभवान्धकारातिवि-  
घातकरणो भवः । दद्यादः सम्पदो देवो योग जाजिनभूतिभृत् ॥  
श्रीविक्रमार्कान्तपकालातीतसम्बत्सराणामेकषष्ठ्यधिकायामेकादश-  
शत्यां माघशुक्लषष्ठां प्रतिष्ठाभूत् ॥

*Translation.*

(Line 1st is not decypherable. . The second has two s'lokas in the Bhujangaprayāta meter and the first eleven syllables of another in a different meter.) Next came the protector of earth, Mahipāla Deva, who established himself in his dominion along with the Gopālikas. His valour had caused the heads of his enemies to incline, whereby garlands had dropt from them in respectful offering before his footstool—(?) Proficient in destroying hosts of inimical Kshetrias, he

placed the earth under one royal umbrella. He spread (the glory of) his deeds to the extreme verge of the three regions, and placed it as a shell ornament\* on the temples of the elephants which guard the (ten) quarters of space.

(3rd line, after eleven syllables a verse each in the Vansantatilaka and the Anustup meters.) His widespread majesty, like the rays of the sun, proved insufferable on every side, of him whose feet rested on the heads of royalty—the remover of vice.† His enemies (—) fly far from the ardour of his commencing warfare—even the news of his approach drives them away to a distance. (Here 19 syllables in the Upendravajra meter missing.)

(4th line, after 9 syllables 1 s'loka each in the Indravajra and the Drutavilambita meters.) The auspicious was born, he whose family was in Mathurá, the disinterested, the cherisher of Káyasthas.‡ Feeling delighted, all good people named him Manoratha§ for verily his mind was directed to the path which leads to the three-fold enjoyment of virtue, wealth and pleasure. All the resources of arithmetic and rhetoric fail to those who attempt to write in praise of the income and expenses of King Bhuvanapála (four syllables unintelligible).

(5th line, after 6 syllables the second half and a full s'loka in the Indravajra meter and 1 in the Vañsasthavila.) Like Ramá wife of Vishṇu she was great in love and affection, and had made her race, morals, and accomplishments manifest by her conduct. Unto him was born by her a son renowned for noble deeds, who made the blossom of desire of the respected to blow, who like the moon to the four oceans—?

The waving of the flag on the top of his palace of beautiful white|| and black|| marble seemed to fan away the vices of mankind (two syllables wanting to complete the verse).

(6th line, after 9 syllables the latter half of a Upendravajra

\* In allusion to the ornament of cowries with which elephants' heads are generally decorated.

† *Dosha* in Sanskrit, which in the case of the king means vice, and in that of the sun, night; as one removes night so does the other the vices of mankind.

‡ Lit. The rain-bearing cloud to the forest of Káyasthas. It is remarkable that he should have selected the Káyasthas for his special care.

§ There is a play upon the word Manoratha (desire or the object of desire) which cannot be reproduced in English, and consequently the reason of the prince's being called by that name, does not become apparent.

|| Of the colour of the enemy of Cupid *i. e.* Mahádeva who is white, and that of Purvámara or demons *i. e.* black.



s'loka and a s'loka of 18 syllables to the foot) His gentle and pure smile added to the lustre of his brilliant necklace—?

His fame which pervaded all the three regions of the universe had enlightened all quarters. A son Madhusudana, who was like a sun to the bright lotus of his race, was born. He was familiar with all great merits. Unto him of great and noble qualities, who was eulogized by the learned (16 syllables unintelligible).

(7th line after 10 syllables. Two s'lokas, one in the vasantatilaka and the other in the Prithvī measures.) By whom religion was purified for ever, that religion which ennobles the mind every where in the three regions. Her powers would fail her were even Sáradâ\* to attempt describing his pure and wonderful disposition. That wise king considering the life of mankind to be as unstable as water held in the palm of the hand—

(8th line, 1 s'loka in the Indravajra and 1 in the Totāka.) He placed wealth earned by his own hands for the gratification of the good people of the earth. Therefore did mankind say that the great full moon of gratification was born of him.

His treasure of virtue daily increased by his devoting his purely earned wealth to the preservation of falling or prostrate temples, or such as might in future be destroyed for want of care. He removed the sufferings of yatis, Brahmanas, and of men diseased or in misfortune; he also built a temple to Hara the destroyer of the world (12 syllables unintelligible).

(9th line, after 5 syllables the second half of a s'loka in the Mandākrántā, a s'loka in the Anustubh and the date in prose.) The saint, who was like unto a flag-emblazoned store-house of sweet and poetical language, and who composed this most excellent eulogy, is named Sri Jasodeva. May the god Bhava (Siva) the destroyer of the enemies, the mind-born† and Andhaka,‡ who dresses himself in elephant hide and ashes, bestow on you wealth! This was dedicated in the year of King Vikramārka, sixty-one plus eleven hundred, in the month of Mágha, the 6th day of the waxing moon,

Nos. 9 and 10. not given by Col. C.

No. 11. Teli Mandir, Fort of Gwalior.

\* The goddess of poetry.

† The Hindu Eros. Manobhava.

‡ A giant of that name.

ॐ नमः ॥ वे \* श्रीशकरेन्द्रवलतदिठभुज चक्रेंसुललासे

No. 12. Teli Mandir, Fort of Gwalior.

ना सीहसय

नागसींहस्य

No. 13. Teli Mandir, Fort of Gwalior.

श्रीसकर देवजसर्व्व

No. 14. not given by Col. C.

No. 15. From the Temple of Ambiká Devi at Suhaniya.

ॐ सिद्धि; संवत् १४६७ वर्षे मार्गसुदि ५ सो, दिनं ॥ महा-  
राजाधिराज श्रीवीलङ्गदेवः । श्रुत्तियिं काकौमनपुंकर वासौः । प्र-  
धान — जनार्दनः । भुजदानु रा — — ज — । सूत्र यारदान  
वामुः ॥ माठा पेति — — — ॥ —

Prosperity! On the 5th day of the waxing moon in the month of Mágha, Samvat 1467. Mahárájádhirāja Bilanga Deva (rest unintel-  
ligible). Col. C. reads the name, Virama.

No. 16. From the foot of a Colossal Figure at Chaitnath, Suhaniya.

६ः ॥ सिद्धि । सन्तु १४६७ वर्षे वैशाखसुदि १५ दि—न मौ—म द्यावे  
वे र — — — करा ब्रह्मभूता सर — गत्या र — आदि अखण्ड  
ठा — — औख — क — सुत — रिता मु ठे ठ — व —

May prosperity attend (on all) on Sunday the full moon of Vais'ákha, Samvat 1467. (The rest unintelligible.)

No. 17. From the Great Temple at Suhaniya, on Pillars.

अंविवत्तदासण — ॥ ऐ — सिद्धि संवत् १४६७ वैशाखसु ६ रवो  
श्रीडुंगरे — नृपः साधनोपुत्र सद्याट मुकलुनल पुरण वासूयाककल  
पुरु दष ॥ ॐ । ऐ ॥ ह

द्या — कापालागनु श्रीपलिघटसुततिडः

On Sunday the 9th of the waxing moon, in the month of Vais'ákha, Samvat 1497. During the reign of the Mahárájá Dungarendra Deva (rest illegible).

No. 18. Pedestal of a Colossal Figure of Ádinátha at Gwalior.

श्रीआदिनाथाय नमः ॥ संवत् १४६७ वर्षे वैशाख — — ७ शुक्ले पु-  
नर्वसुनक्षत्र श्रीगोपाचलदुर्गे महाराजाधिराजराजा श्रीडुंग — —  
— — — संवर्त्तमानो श्रीकाञ्चीसंघे मायूरान्वयो पुष्करगणभट्टारक



श्रीगणकीर्त्तिदेव तत्पदे यत्नः कीर्त्तिदेवा प्रतिष्ठाचार्य श्रीपंडितरघू-  
तेयं । आभाये अग्रोतवंशे मोदुलगोत्रा सा ॥ धुरात्मा तस्य पुत्र साधु-  
भोपा, तस्य भार्या नाक्की । पुत्र प्रथम साधुक्षेमसी द्वितीय साधु-  
महाराजा तृतीय असराज चतुर्थ धनपाल पञ्चम साधुपाल्का ।  
साधुक्षेमसी भार्या नोरादेवो पुत्र — ज्येष्ठपुत्र भग्यायि पतिकौल ॥  
भ— भार्या च ज्येष्ठस्त्री सरसुती पुत्र मल्लिदास द्वितीय भार्या सा-  
ध्वीसरा पुत्र चन्द्रपाल । क्षेमसीपुत्र द्वितीय साधु श्रीभोजराजा भायी  
देवस्य पुत्र पूर्णपाल ॥ एतेषां मध्ये श्री ॥ त्यादिजिनसंघाधिपति काला  
सदा प्रणमति ॥

Salutation to Adinátha. On the 7th of the waxing moon, when she was in the mansion of Punarvashu, in the month of Vaisákha, Samvat 1497, when the Mahárájádhírájá Dungarendra Deva reigned in the fort of Gopáchala. The saint Gunakírti Deva, of the congregation of Kánchi and of the race of Magura, who belonged to the class (gana) of Pushkara, was succeeded by Kirti Deva, next the respected priest Pandita Sri Raghu, next Pandita Sri Bháyá of pure soul, who belonged to the race of Agrota and the clan (gotra) of Modgala. His son was *Sádhu* Bhopá, whose wife was Nanhí, whose first son was *Sádhu* Kshemsi, second son *Sádhu* Mahárájá, third Asarájá, fourth Dhanapála and fifth *Sádhu* Pálká. The wife of *Sádhu* Kshemsi was Norá Deví of whose sons the eldest was Bhagáyí, whose son was Kaulabha. The eldest wife of the latter was Saraswatí by whom he had Mallidása. His second wife was Sádhheswará or the faithful (Sáddhí) Swará, whose eldest son was Chandrapála. The second son of Kshemsi was *Sádhu* Sri Bhojárája. The son of Bháya Deva was Purna Pála. Among these Kálá the head of the congregation of Ádi Jina, offers constant salutation.\*

- (१) सिद्धि संवत् १५१० वर्षे माघसुदि ८ (अ) शुभे (म्यां) श्रीगो-  
पगिरौ महाराजाधिराजरा-  
(२) जा श्रीडंगरेन्द्रदेवराज्यप्र — — श्रीकाञ्चीसंघेमायूरान्वये  
भट्टारक श्री  
(३) क्षेमकीर्त्तिदेवस्तत्पदे श्रीहेमकीर्त्तिदेवास्तत्पदे श्रीविमलकीर्त्ति-  
देवाः — —

\* I am very doubtful about the accuracy of this translation. The name Kálá is most probably incorrect. I publish this only as tentative.

- (४) डिता — — सदाम्नाये अग्रोतवंशे गर्गगोत्रेसा — — — त  
 (५) योः पुत्रा ये दण्डाय श्रीवन्द भार्या मालाह्वी तस्य प्रवसा० घेघार  
 रा—जीसा — — — दु  
 (६) तीयसा० हरिवन्दभार्या जसोधर हितये — — — —  
 — णसीसा० सधासा० तृती  
 (७) यहेमा चतुर्थसा० रतीपुत्रसा० सह सापं — मु सा० धं—  
 सा० सल्लापुत्रसेवं ए  
 (८) तेषां मध्ये साधु श्रीचन्द्रपुत्र शेषा तथा हरिचन्द्रदेवकी  
 भार्या — —  
 (९) दीप्रमुखा नित्यं श्रीमहावीरप्रतिमा प्रतिष्ठाप्य भूरिभक्त्या प्र-  
 णमंति ॥  
 (१०) अङ्गुष्ठमात्रां प्रतिमां जिनस्य भक्त्या प्रतिष्ठापयतो महत्या ।  
 फलं बलं राज्य  
 (११) मनन्तसौख्यं भवस्य विच्छित्तिरथो विमुक्तिः ॥ शुभं भवतु  
 सर्वेषां ॥

On the 8th of the waxing moon, in the month of Māgha, Samvat 1510, in the reign of the supreme lord of great kings, king Sri Dungarendra Deva, High Priest (Bhattārka) Sri Kshemakīrti Deva of the congregation of Kānchi and of the race (gotra) of Māyura, next his successor Hemakīrti Deva, and next his successor Amalakīrti Deva. (Rest illegible.)



## LITERARY INTELLIGENCE.


The following is part of a letter to E. C. Bayley, Esq. from Col. Cunningham, dated 6th May, 1862.

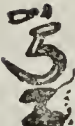
"I have got a small silver coin, similar to the oboli of Eukratides, but of a new barbarous king, *Obv.* King's head, bold *Rev.* a standing figure, almost the same as that on the copper coins of Kadaphes Zathus. Legend in two lines HPAOY KOIPAN (Y)—The name appears to be complete. I read it as Heräus (? Hêrâwâ ? Erâ.) I have two somewhat similar coins, but still closer imitations of the Eukratides obolus with the legend KOZOYAO in one line, the other line being wanting except OKO.—*Koipavos* is a well known name for king, and Era or Ela or Aila is an Indian name.

With regard to Oskäus, I rather incline to read the name as Huvoskäus. There is no Y after *Turauno*, unless the T looking letter be taken for Y. To read TOY we must omit the Y from TYPANNOY. I would prefer reading TYPANNOY OYOΣKAOY ΣANAB . . YIIIION-ANOY. This would be Voskäus, but might also be read as Hovoskäus, which would be a near approach to Huvishka. The actual letters, however, read TYPANNO TOY OΣKAOY.

The name of the father of Zeiônisos appears to be Manigala. One of my coins has ANNII on the Greek side. May he not have been the founder of Manikyâla. This name, as it at present stands, is of course a pure Hindu one, Manikya + alaya, but the name may have been slightly altered from *Manigalaya*. I have an impression of a third didrachm of Zeionisos, different somewhat from my own two coins. I have sent for the coin itself. It seems odd that we do not get any of Manigal's own coins. I have half a dozen of his son's copper coins, besides the two silver ones. If we could get some more of these coins which give the father's names we should get some valuable facts to add to our scanty knowledge of early Indian history.

Have you any specimen of the *Jital*? I have one small copper coin with the word Jitalah جتله I cannot make out the legends. I read *bagâni* — ? بگانی does the coin express the value of a *jital* in *gânis*?

I have two Kashmirian copper coins with  on the female side,

and  on the male side?—*Unm* (atti Varmma).

Another good specimen of the square Satrap Horseman and Lion type has come to hand. I make out the legends as follows.

H

APTAYOY XAPATIΩΣTEIΣATPAII EI

APTΑov YIOY XAPAΔΩΣTHΣ ΣATPAIIHΣ

*Megadastes* is a known Persian name. The native legend I read as follows.

*Attasa-putrasa Tsatrapasa Karada ostasa.*

The father's name is somewhat doubtful. Perhaps Artas, or Artavas reading APTAYOY as the genitive, and omitting YIOY — which is not absolutely necessary — artabas occurs in Ktesias. Have you any specimens with you to clear up this reading?

I have a new relative of Gondophares, but unfortunately the name is incomplete and very much rubbed BA sileus basileon. It is not Orthagnes, as the head is quite different. The end of the name may be ATHC or APHC. The native legend is in tolerable order, but quite unintelligible. Beginning from the two streamers of Victory's wreath it is

Maha.....disa-sa hidasa tradinasa janatinuja


?

Sahina Satadinasa janadinuja ra?

It is possibly a coin of Gondophares himself.

I still continue to puzzle over the dates of the Mathura inscriptions, as well as over those of the Manikyâla and Kâbul Topes. The dates of the Mathura inscriptions *ought to be* in the era of the Nirvâna of Buddha—those of the Manikyâla and Kâbul Topes may be either in the era of the Nirvâna of Buddha, or in that of the Seleucidæ, or in some local Bactrian or Indo-Scythian era. The Parthians certainly established an era, but they as certainly made use of the Seleucidan era on their coins. The last idea that has struck me is that some one or more of the characters may be mere indices or exponents—as was the case in Europe, and also in Western India. Thus in Europe 1862 would have been written 1862 where the let-

MCXI,

ters below show that the figures above represent thousands, hundreds, tens and units. In the Western Cave inscriptions the *hundreds* and *thousands* are written with indices — thus  = hundreds 3 — and



५४ = thousands 4 — while the tens and units have separate figures. Now to apply this to our inscriptions from Mathura, Manikyâla and Kâbul. The Mathura dates give  $\times \eta \eta \text{†}$  and  $\times \text{†}$ . Let us consider  $\eta$  as equivalent to the Arian letter  $\eta = h$  for *hat* = *sat* = 100, then the first character  $\times$  may be =  $\text{†} = 4$  and the date would be 4 hundreds plus 31 in the first case or 431, and 401 in the second case, by adopting Thomas's  $\eta$  for 30 — which I doubt. The figure 4 is represented indifferently by *ch*, or by *chh* — as  $\text{†}$  or =  $\times$ . In the Manikyâla inscription the date is  $\times \times \eta$  which might be read as “hundreds 4, plus 4, or 404. It is no matter which way the date is read—as by reading from the left it would be 4 plus 4 hundreds. The Wardak date  $\eta 3 3$  would be hundreds 3 plus 3 = 303 which if of the Seleucidan era would be = 9 B.C. The day of the month, however, seems to include the same cipher  $\eta$ . If this is the same character my new reading falls to the ground at once—but it is possible to read  $\times \eta \eta \text{†} = \text{vrihiya 4}$ .

The whole subject is full of difficulty. In the Mathura dates it would be better perhaps to take the sloping character  $\eta$  which agrees with the Kâbul and Manikyâla forms as the index for hundreds, but then the date would be  $\times \eta$  in hundreds.

One thing is certain = in the Western Cave inscriptions, the units and tens are represented by independent cyphers = the hundreds and thousands by the unit cyphers with indices. Now as the Kâbul and Mathura inscriptions are of about the same period, we ought to expect to find the same system of notation employed in them.

I have a suspicion that the two Mathura dates of  $\times \eta \eta \text{†}$  and  $\times \text{†}$  are the same, the two middle characters of the first being new exponents —  $\text{†}$  must be an unit as it is used to number the day of the month. It is the figure 1 of the Satrap inscriptions of the Western Caves. If we might read  $\times \eta \eta \text{†}$  as 4 *h a* 1, that is 4 *hat aka* anka 1, = 4 hundreds + units 1 = 401 *anka* being taken for *unit*. The figure 7 is represented by  $\eta$  in the Cave inscriptions. Thomas's  $\eta$  for 30 is a mistake, which he has adopted from Stevenson. His  $\eta$  for 30 may be correct—and if so, the Mathura

date according to my reading will be 4 h 31 = 4 hat (or hundreds) + 31 = 431 which deducted from 477 or 457 will give B.C. 46 or 26—for Huvishka — and I would read ~~४३१~~ as 400 + 1 = 401 — which would give 76 or 56 B. C. for Vasu ( — ). Now the Kanwa Prince Vasu Deva reigned from 66 to 57 B. C. This date would therefore suit him exactly.

× × १ = h 4 + 4 = 404 of *Manikyāla* (Kanishka), and *Kohwāt*. The Chinese and the Ceylonese place kamishka 400 years after Buddha. The Wardak date of 733 = h 3 + 3 = 303 must be of the Seleucidan era = 9 B. C. for Huvishka the date of Kanishka being as above 404—457 = 53 B. C. According to the Raja Taringini the three brothers reigned 60 years.”

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Dr. Hall writes from London, Oct. 10th.

“ Benfey has written a Sanskrit grammar for Englishmen. It has been translated into English; and Müller is seeing the translation through the press. The fourth part of Muir’s Sanskrit Texts is well advanced. The 4th vol. of Müller’s Rig Veda and commentary will be out in a few days.”

We are glad to announce that our learned coadjutor has been appointed Professor of Hindustani and Indian Jurisprudence in King’s College.

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JULY 1862.

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The monthly general meeting of the Asiatic Society of Bengal was held on the 2nd instant.

Colonel R. Strachey, Vice-President, in the Chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

From Mr. E. B. Harris, impressions of an inscription on the back of an image of Buddha found in Sultangunge, near Monghyr. The inscription contains the Buddhist creed so common on such images.

2. From Major J. C. Haughton, a hollow wooden shield from Port Blair, used by the natives as a *tom-tom*.

3. From Archdeacon Pratt, a copy of his papers from the Philosophical transactions on Mountain and other Local Attraction in India.

Read letters—

From H. Bell, Esq., intimating his desire to withdraw from the Society.

From the Under-Secretary, Government of Bengal, forwarding an extract of the annual general report of the Rajshahi Division giving some account of a Cyclone which visited the western part of the district in March last.

From the Under-Secretary, Government of India in the Home Department, containing the following extract from the proceedings of the Government of India in the Financial Department, with reference to the Society's solicitation for a reconsideration of the decision of the late Hon'ble Court on Mr. Blyth's application for a pension.

“It appears from the papers on the case that Mr. Blyth’s application was considered inadmissible by the late Hon’ble Court of Directors, on the ground that ‘the grant of pensions from the public revenues is strictly limited to those who are in the direct service of Government.’ This principle still holds good, and His Excellency the Governor-General in Council does not think that Mr. Blyth’s application for a pension can be supported on the ground now advanced by the Asiatic Society. As a special case, however, it appears to His Excellency in Council to have claims to consideration. It is the case, His Excellency remarks, of a man of science, who has devoted himself for a very small salary to duties in connexion with the Asiatic Society, a body aided by and closely identified with the Government of India from which the public have derived great advantage.

“Mr. Blyth may truly be said to have been, in a great measure, the creator of the Natural History Museum, which has hitherto supplied the place of a Public Museum in the metropolis of India and which will probably, soon be made over to Government, as part of a National Museum. This collection is open to the public free of charge, and many thousands have derived benefit and instruction from it.

“In addition to the direct educational benefits of the Museum, the character and standing of the Asiatic Society undoubtedly exercise a most beneficial indirect effect in maintaining a high standard of Science and Literature among a numerous body of the Civil and Military Officers in the service of Government, and in one important department, that of Zoology and Natural History, Mr. Blyth’s labours have done much to maintain and to extend that character.

“His Excellency in Council considers, therefore, that if, under such circumstances, Mr. Blyth should after twenty years’ service, be compelled to retire from ill-health, brought on very much by his exertions in pursuit of science, it would not be creditable to the Government that he should be allowed to leave without any retiring pension, and His Excellency in Council is of opinion that if the rule which limits pensions to those who are in the direct service of Government can be relaxed, the application on behalf of Mr. Blyth ought to be favorably entertained.”

The Chairman moved that the thanks of the Society be conveyed to His Excellency in Council for the liberal concessions made in favour of Mr. Blyth.



Carried unanimously.

The nomination of the Hon'ble W. Grey to be a member of the Council, *vice* the Right Hon'ble S. Laing, was confirmed.

The Council reported that they had appointed Colonel R. Strachey, a Vice-President, and Mr. J. G. Medlicott, a member of their body, in the place of Mr. Oldham who has left India.

With reference to the announcement made at the last meeting, the Council reported that they had addressed the following letter to Government on the subject of the projected Government Museum :—

FROM THE SECRETARY TO THE ASIATIC SOCIETY OF BENGAL.  
TO E. C. BAYLEY, ESQ.,

*Secretary to the Government of India,  
Home Department.*

*Dated, Asiatic Society's Rooms, Calcutta, June 18th, 1862.*

SIR,—I am desired by the Council of the Asiatic Society to reply to your letter No. 2564, dated the 22nd May, informing the Society that His Excellency the Governor-General in Council is now prepared to consider the offer made by the Society in 1858, relative to the foundation of a public Museum in Calcutta, to which the Society's collections might, under certain conditions, be transferred.

2. The Council cordially thanks His Excellency in Council for the liberal proposals that he has made to the Society, and for the strong additional proof that he has now given of the interest the Government of India takes in the advancement of science by offering to establish a Museum in this city to be maintained by the State.

3. But the Council regrets that it is unable to give an immediate reply to the offers thus made. The resolution of the Society which authorized the Council to enter into communication with the Government on this subject was passed in May, 1857, and the whole matter has now been in abeyance for several years. The Council therefore feels that no real decision can be communicated to the Government until the entire subject has again been fully brought before the members of the Society, and re-considered according to the regular forms of procedure. At the same time the Council, being generally disposed to concur in the propriety of carrying out in their main features, the proposals made in 1858, believes that it will be useful and will tend to an early decision of the questions involved in your letter, if it states the impressions of its own body on these questions

and submits at once a preliminary scheme, suggesting the general scope of the details which it would propose in filling up the outline which has been sketched out by you. The process of making a reference to the Society at large is of necessity tedious; and the Council considers that it will best meet the interests of the Society and the convenience of the Government, if it endeavours to obtain the general approval of the Government to a scheme which it could recommend to the acceptance of the Society in a complete form. In this sense and with the distinct reservation, that the opinions expressed in this letter are those of the Council, and cannot be held to be binding on the Society, or to interfere in any way with its complete liberty of action in dealing finally with the matter, the Council desires me to make the following observations.

4. The Council has understood your letter to be designed to elicit from the Society an expression of its wishes as to the details of the general arrangements, which it had been said must be satisfactory to the members of the Society, before its collections could be transferred to a Public Museum; and it is with much respect that the Council desires to submit for the favourable consideration of His Excellency the Governor-General the following scheme, which in its essentials is, it thinks, quite in accordance with the proposals contained in your letter:—

#### I.—MUSEUM.

I.—The Museum to be a Public Museum, the management being vested in a Board of Trustees to be constituted by an Act of the Legislature.

II.—The Trustees to be fourteen in number; the President to be His Excellency the Governor-General of India; the Vice-President to be the President of the Asiatic Society; of the remainder, six to be named by the Government, and six by the Asiatic Society.

III.—The complete management, arrangement, and disposal of the Museum to be in the Trustees.

IV.—The Museum to be open to the public under suitable rules to be approved by the Government.

V.—The rules further to provide for the continuance to the Members of the Asiatic Society, in respect to the New Museum, of all their existing privileges in respect to their own present Museum—in regard to their rights of entering the Museum, and of examining



or taking out specimens from it—subject to such modifications as shall be made by the Trustees from time to time in communication with the Council of the Asiatic Society.

VI.—Suitable clauses to be introduced into the Act of Incorporation to provide for the restoration to the Asiatic Society of its contributions to the Museum, if the Trust shall hereafter be dissolved; and for enabling the Society to mark by a special label its donations to the Museum, and to keep a separate Catalogue of all specimens so contributed by it.

VII.—The Council understands it to be the intention of the Government to endow and maintain the Museum on a scale suitable to the importance of the object for which it is founded, and corresponding with the great value of the contributions to be made to it by the Society.

VIII.—The locality suggested for the Museum, the site of the present Small Cause Court, appears to the Council to be excellent.

IX.—Regarding the name to be given to the Museum, the Council would desire to abstain from offering any present opinion; a decision on this point is obviously not pressing.

X.—Under the foregoing stipulations, the Council would recommend to the Society to agree to the complete transfer of all its collections to the new Museum; the Library and Manuscripts, Pictures, Busts, and other miscellaneous objects to be specified hereafter, to be reserved by the Society.

## II.—ASIATIC SOCIETY.

XI.—The Asiatic Society to remain constituted exactly as at present, having the complete management and disposal of its own affairs.

XII.—The Council considers that the Society would be desirous of receiving accommodation in juxta-position with the new Museum building.

XIII.—The house for the Society should provide a Meeting Room; an Ante-room; a Library; two Reading-rooms or Study Rooms; a Room for the Librarian and Clerks; and other ordinary subsidiary minor accommodation.

5. There is only one point on which the Council would desire to suggest to the Government any important modification of the proposals that have been made in your letter. It has reference to the

disposal of the Society's present house, which, for the following reasons, the Council would submit, may with justice be left in the hands of the Society, and not be transferred to the Government in return for the accommodation offered in juxtaposition with the new Museum. The Council has nothing further from its intentions than to enter into negotiations with the Government on this subject in anything approaching a spirit of self-aggrandisement or of barter. The object which the Government and the Society alike have in view in this matter is the furtherance of Science and of true knowledge, and there is no room for the intrusion of any questionable motive on either side. But the Council feels strongly the great value, not only in a scientific sense, but in a pecuniary sense also, of the collections which it offers to hand over to the new Museum. These collections have been brought together after long years of patient labour, and at great expense to the Society; and the Council rejoices that the Society has so bestowed its means, and that it is now placed in a position to give still greater effect to its past work by bestowing its Museum on an Institution which promises to fulfil all its aspirations in this direction. And having this feeling, the Council thinks that it may fairly and frankly suggest to the Government that, in return for the very extensive collections thus to be presented to the public by the Society—collections of which the money value must be estimated at many thousand pounds—the State might, without for a moment considering that it conferred a favour in so doing, provide the Society with the accommodation it would need near the new Museum, and leave to the Society the disposal of its existing house, for the purpose of reinforcing the very restricted pecuniary means now at its disposal. If proof be needed that these means will in the future be well applied, the Council is satisfied that it will be completely given in the past history of the Society; and it appeals confidently to the manner in which the Society's Museum has been got together, and to the present proposals regarding its future disposal, to show the spirit in which the Society may be expected to perform its functions. The objects of the Society will be, as they ever have been, the advancement of knowledge. But from the very nature of the case, the numbers of the Society being small, and the contributions of its Members limited, the want of pecuniary means has always greatly restricted the sphere of the Society's usefulness,



and, under any imaginable circumstances, no doubt will still continue to do so. The Council therefore trusts that the Government will see in this suggestion nothing but the indication on their part of what appears to them an equitable and practicable way of making the present arrangements as conducive as possible to the usefulness of the Society, without making any serious or undue claim on the Government.

6. Should His Excellency the Governor-General in Council be disposed to meet the views that have thus been expressed by the Council, the Council trusts that the Society would ratify an arrangement on such a basis.

I have the honor to be,

Sir,

Your most obedient Servant,

W. S. ATKINSON,

*Secretary to the Asiatic Society of Bengal.*

The following gentlemen duly proposed at the last meeting were balloted for, and elected ordinary members :

A. M. Monteath, Esq., C. S. ; Hon'ble T. J. H. Thurlow ; J. Gordon, Esq., C. S. ; Captain H. Hyde, Bengal Engineers ; Baboo Bhola Nauth Mullick.

The Hon'ble Major General Sir R. Napier, K. C. B. ; Major Allen Johnson, Bengal Staff Corps.

The following Gentlemen were named for ballot at the next meeting :—

H. Beverley, Esq., C. S., proposed by Dr. Duka, seconded by the President.

Captain J. P. Basevi, Bengal Engineers, proposed by Lieutenant-Colonel Thuillier, seconded by Major Walker.

J. W. S. Wyllie, Esq., proposed by Mr. Bayley, seconded by the President.

W. L. Heeley, Esq. C. S., proposed by Mr. Atkinson, seconded by the President.

Col. Vineent Eyre, proposed by Archdeacon Pratt, seconded by Col. R. Strachey.

Communications were received—

1. From Rev. A. Brandt through Major Dalton, a copy of a Phonetic table of the Alphabet prepared by a Philologer of Finland.

2. From Baboo Gopee Nauth Sein, Abstracts of Meteorological Observations taken at the Surveyor General's Office, Calcutta, for March and April last.

3. From Mr. E. C. Bayley, some remarks on certain coins recently procured for the Society from Captain Stubbs.

Mr. Bayley remarked that the whole collection obtained from Captain Stubbs had not as yet been fully examined, but that he would make some observations on a few of them which appeared to him especially worthy of notice.

Two of these were gold coins of Malwa, the first a fine one of Mahomed Shah, the son of Hoshung Shah.

It bore on the obverse the titles of that King "al Sultan ul Azim—Taj ud dunia wa uddin Abul Mozuffer;" on the reverse, "Mohamud Shah bin Hushung Shah ul sultan" and round the margin the name of the coin "al Sikah," the mint Shadiabad or Mandoo, and the date 840.

As to the latter it was curious that Ferishtah quoting the Tari-khi Alfi in two places gives dates which place the death of this sovereign about two months before the close of 839, A. H. This point is given with much circumstantiality and detail, so as to show that it is no mere clerical error.

The other coin which was somewhat similar in its reverse appearance is of considerably later date.

The obverse inscription ran thus: "ul Sultan ul Azim bin Ghieas uddunia wa uddin Khilji" (bin?), Abul Mozuffer Mahmood Shah Khuld Allah Khalafalu.

The reverse contained (imitating the coins of Alaudin Khilji of Dehli) "Sekunder ul Sani Yamin ul Khalafat Nasir Amir ul mominin." The reverse margin gives the same legend as the other coin, but the date which was imperfect was either 908 or 909.

The next three coins were coins of the earlier Khalifs.

No. I. was a coin of the Abbaside Khalif al Mahdi and was struck at Bagdad in 162 A. H. It is described and figured as No. XXIII. in Marsden's Numismata Orientalia.

The others were both apparently of Haroun al Rashid, dated respectively 19? and 192. The date on the first named coin, however, was somewhat rubbed and dubious, and the name of the mint was also unfortunately imperfect. This was the more to be regretted as the name of the mint seemed to be a new one.



The second coin, which was very perfect in its preservation of beautiful execution, was struck at Bagdad. The second was Marsden's No. XLVI.

The first named coin was not described in Marsden, and one of the inscriptions was not quite deciphered; the character used was too of rather peculiar form.

The Dehli rebels had destroyed the copy of Professor Frahn's works which Mr. Bayley once possessed and he was not quite certain if the coin was, as was probable, an undescribed mintage.

Mr. Cowell noticed that Mr. E. Thomas had on more than one occasion, but especially in his paper on Pathan coins, pointed out the untrustworthiness of the dates given by the Mohammedan historians of India. Syud Ahmed had further illustrated it in the edition of Zia Barni's *Tarikh-i Feroz Shahi* recently published in the *Bibliotheca Indica*, by dated quotations from Khosru and other poets, showing that in several instances the dates given in the history were manifestly erroneous.

Mr. Bayley replied that this was true, and the coins were ordinarily more trustworthy than the histories, but even they were not always accurate. This proceeded in various instances from different causes, and he instanced the coins struck during the interregnum which followed the departure of Timour from Dehli when coins were struck correctly dated, but in the name of deceased kings, for fear of arousing the vengeance of that tyrant or his successors.

So also more recently, during the mutiny at Bareilly and Lucknow, coins had been struck in the name of Shah Alum, and in those struck at Bareilly the correct date was given, and what would have been the year of his reign had he been living.

4. From Babu Rajendralal Mitra a paper on the vestiges of the kings of Gwalior and a note on a copper plate grant from Sarun. The Babu read the papers, and the thanks of the meeting were voted to him for his valuable communication.

The papers will appear in the Journal.

5. From Mr. Cowell, a paper on the *Chárváka Dars'ana* or Materialistic Philosophy of the Hindus.

Mr. Cowell read his paper, and a vote of thanks was passed to him.

The paper will be published in the Journal.

The Librarian submitted the usual monthly report.

The meeting was then made special, pursuant to notice, in order to decide upon the propositions of the Council relative to certain proposed changes in the Code of Bye Laws.

The Chairman read the report of the Council on the subject, recommending the adoption of the proposals by the Society.

The question having been put to the vote by the Chairman, the votes were found to be as follows:—

|                 |      | Resident voters,<br>for the amend-<br>ment, | Non-Resident<br>voters for<br>amendment. | Resident voters,<br>against. | Non-Resident<br>voters, against. |
|-----------------|------|---------------------------------------------|------------------------------------------|------------------------------|----------------------------------|
| Proposal, ..... | I.   | 12                                          | 60                                       | 0                            | 0                                |
| Ditto, .....    | II.  | "                                           | "                                        | "                            | "                                |
| Clause, .....   | 1.   | 12                                          | 59                                       | 0                            | 1                                |
| Ditto, .....    | 2.   | 12                                          | 60                                       | 0                            | 0                                |
| Proposal, ..... | III. | 12                                          | 57                                       | 0                            | 1                                |

The proposals were accordingly carried.

The following books and periodicals have been added to the Library since the meeting held in June last.

*Presented.*

Brockhaus' Berichte de Phil-Histoire classe der Konigl-Sachs—Gesellschaft der Wissenschaften.—BY THE AUTHOR.

The Calcutta Christian Observer for June, 1862.—BY THE EDITORS.

The Journal of the Chemical Society of London, Vol. XV. Parts 1—4.—BY THE SOCIETY.

The Oriental Christian Spectator for March and April.—BY THE EDITORS.

Proceedings of the Royal Geographical Society of London, Vol. VI. No. 2.—BY THE SOCIETY.

Address delivered at the Anniversary Meeting of the Geological Society of London, 21st February, 1862.—BY THE SOCIETY.

Papers on Mountain and other Local Attraction in India.—BY ARCH-DEACON J. H. PRATT.

The Quarterly Journal of the Geological Society of London, Vol. XVIII. Part 2.—BY THE SOCIETY.

Report of the British Indian Association for May.—BY THE ASSOCIATION.

Report of the Committee of the Bengal Chamber of Commerce from November 1861 to April 1862.—BY THE CHAMBER.



Schlagintweit's General Hypsometrical Tableau of India and High-Asia, part of Vol. II. of Results of a Scientific Mission to India and High-Asia.—BY MESSRS. DE SCHLAGINTWEIT.

Transactions of the Royal Irish Academy, Vol. XXIV. Part 1.—BY THE ACADEMY.

Weber's Die Vedischen Nachrichten von den Naxatra, Part 2.—BY THE AUTHOR.

Zeitschrift der Deutschen Morgenlandischen Gesellschaft, Bd. XVI. 1 and 2 Heft.—BY THE SOCIETY.

*Exchanged.*

The Athenæum for April 1862.

The Philosophical Magazine Vol. XXIII. No. 155.

*Purchased.*

Benfey's Orient und Occident, Erster Jahrgang. Viertes Heft.

Abhandlungen für die Kunde des Morgenlandes, Band II. No. 3.

Revue et Magasin de Zoologie, Nos. 3 and 4 of 1862.

Journal Des Savants for April, 1862.

Comptes Rendus Hemdomadaires des Seances De L'Academie des Sciences —Tome LIV. Nos. 13—16.

The Annals and Magazine of Natural History, Vol. IX. No. 53.

Revue des Deux Mondes, Tome XXXVIII. for 15th April and 1st May.

The Literary Gazette, Vol. VIII. Nos. 119 and 200.

The Parthenon, Vol. I. Nos. 1 and 2.

The Edinburgh Review, Nos. 233 and 234 for January and April.

The Quarterly Review, No. 222 for April.

Acharius' Lichenographia Universalis, 4to. Gottingae, 1810.

Acta Physico-Medica Academiae Cæsareæ Naturæ Curiosorum, 10 Vols., 4to. Norimbergæ.

Nova Acta Physico-Medica Academiae Cæsareæ Leopoldino—Carolinæ Naturæ Curiosorum, 8 Vols. 4to. Norimbergæ.

Algæ Maris Mediterranei et Adriatici, Auctore. Jacob G. Agardhl, Royal 8vo. Paris, 1842.

Systema Algarum, Adumbravit C. A. Agardh. 12mo., 1824.

Conspectus Fungorum in Lusatiæ Superioris Agro Niskiensi crescentium. Auctoribus J. B. de Albertini et L. D. de Schweiniz, 8vo. Lipsiæ, 1805.

Annales du Museum National D'Histoire Naturelle par Les Professeurs de cet Etablissement, 21 Vols. 4to. Paris, 1802—27.

Annals of Natural History or Magazine of Zoology, Botany and Geology. Conducted by Sir W. Jardine, Bart., P. J. Selby, Esq., Dr. Johnston, Sir W. J. Hooker and R. Taylor, F. L. S., 20 Vols. 8vo. London, 1838—47.

Petri Artedi Renovati, Bibliotheca et Philosophia Ichthyologica. 3 Vols. 8vo. Grypeswaldiæ, 1789—93.

Histoire Naturelle des Iles Canaries, par MM. P. Barker—Webb, Et Sabin Berthelot. Imperial 4to. Paris, 1836—44.

Medizinische Zoologie, von J. F. Brandt und J. T. C. Ratzeburg, 2 Vols. in one, 4to. Berlin, 1829.

Ornithologia sine Synopsis Methodica, Par M. A. D. Brisson, 6 Vols. 4to. Paris, 1760.

Catalogue of the Hunterian Collection in the Museum of the Royal College of Surgeons in London, 6 Vols. 4to. London, 1830—45.

Histoire Naturelle Générale et Particulière des Céphalopodes Acétabulifères vivantes et Fossiles—Par Alcide D'Orbigny, 4to. Paris, 1835—48.

Journal of a Residence in Ashantee.—By Joseph Dupuis, Esq., 4to. London, 1824,

Encyclopédie Méthodique—Histoire Naturelle des Animaux, 10 Vols. 4to. Paris, 1782—1825.

Histoire Naturelle des Mollusques, Par M. Le Baron De Férussac, 4to. Paris, 1828. [1829-30.

Synopsis Mammalium, Auctore Joanne Baptista Fischer, 8vo. Stuttgart, Flora Ægyptiaco-Arabica, Par Petrus Forskal, 4to. Hauniæ, 1775.

Voyage Autour du Monde, Entrepris par ordre du Roi, Par M. Louis De Freycinet, with a folio Atlas of Plates, 4to. Paris, 1824.

Voyage en Islande et au Groenland, pendant les Années 1835-36.

Zoologie et Médecine—Par M. Eugène Robert, with a folio Atlas of Plates, 8vo. Paris, 1851.

Voyage De Humboldt et Bonpland—Recueil D'Observations de Zoologie et D'Anatomie, Comparée, Par Al. De Humboldt et A. Bonpland, 2 Vols. Imperial 4to. Paris, 1811—33.

Prodromas Systematis Mammalium et Avium.—Par Caroli Illeger, 8vo. Berolini, 1811.

A History of British Sponges and Lithophytes.—By George Johnston, M. D., 8vo. Edinburgh, 1842.

Specimen Medicum exhibens Synopsin Reptilium,—Par Joseph Nicolai Laurenti, 8vo. Viennæ, 1768.

Manuel D'Ornithologie, ou Description des Genres et des principales Espèces D'Oiseaux.—Par R. P. Lesson, 2 Vols., 12mo. Paris, 1828.

Expédition Scientifique De Moree—Section des Sciences Physiques, 3 Vols., (the third volume having two separate parts) and a folio Atlas of Plates, 4to. Paris, 1836.

Description De L'E'gypte, ou Recueil des Observations et des Recherches qui ont été faites en E'gypte pendant L'Expédition de L'Armée Française, publié par les ordres de Sa Majesté L'Empereur Napoléon Le Grand, 9 Vols. folio of Letterpress and 12 Royal folio Vols., Paris, 1809—20.



## FOR AUGUST, 1862.

The Monthly General Meeting of the Asiatic Society of Bengal was held on the 6th Instant.

A. Grote, Esq., President, in the chair.

Presentations were received—

1. From T. S. Shaw, Esq., Mynpoorie, through Mr. E. C. Bayley a Sassanian silver coin.

2. From Dr. F. E. Hall, a copy of his work entitled “A Rational Refutation of the Hindu Philosophical Systems,” translated from the Hindi of Pundit Nehemiah Nil Kanth Sastri Gore.

Read letters—

1. From the Secretary to the Government of Bengal, forwarding official correspondence on certain beds of coal discovered by Major Sherwill in the Govindpore subdivision of the Maunbhoom district.

The papers shew that this coal is of inferior quality. It has been analysed by Mr. Tween of the Geological Survey, who considers it “for all purposes, except perhaps lime-burning, nearly, if not altogether, worthless.”

2. From the Commissioner of Mysore, forwarding several copies of a table shewing the elevations of certain localities, and the height of certain mountains in the Mysore territories.

3. From the Hon’ble F. W. A. Bruce, Her Majesty’s Minister at Peking, the following letter addressed to the President, in reply to a communication from him on the subject of the Thibetan expedition:—

*Peking, 4th May, 1862.*

DEAR SIR,—I have received your letter on communication with Thibet.

I had previously addressed myself to the lamas who are at present in Peking as envoys from Lhassa, a journey it has taken them three years to effect. But they appear miserably and profoundly ignorant, so much so that not an atom of information could be obtained from them. The difficulty of holding intercourse with them is increased by the necessity of employing the official interpreter attached to them by the Chinese Government.

As soon as certain questions are disposed of which at present absorb all the time the Prince of Hung can give me, I shall enter on the subject with him, and inform the Government of India of the

result. I rather anticipate that the Chinese will decline giving passports to Thibet, on the ground that they do not interfere in the internal administration of the country. Whether I shall be able to induce them to use their influence to favour our views, I cannot state. They are much alarmed at the idea of foreign nations having intercourse with these semi-barbarous races, who lie as a barrier between China and the European Powers. Of this, I have seen some striking proofs lately with reference to the Mongolian tribes.

In the meantime, I beg you to believe that I understand the importance of the subject proposed, and shall be most happy to assist in carrying it out. But as I know that the traditions of China will incline her statesmen to throw obstacles in the way, the subject must be approached with caution, and under favourable circumstances.

The most enlightened Chinese have not got beyond the notion, that it is a less evil to tolerate the presence of foreigners where they have a right to be, than to risk a war for the purpose of keeping them out. But I doubt whether there is one amongst them who does not think their presence an evil.

I remain, &c.,

(Sd.) F. W. A. BRUCE.

The nomination of Col. R. Strachey to be a Vice-President, and of Mr. J. G. Medlicott a member of the Council, *vice* Mr. Oldham, was confirmed.

The following gentlemen, duly proposed at the last meeting, were balloted for and elected ordinary members :

H. Beverley, Esq., C. S. ; Captain J. P. Basevi ; J. W. S. Wyllie, Esq. ; W. L. Heeley, Esq., C. S., and Colonel Vincent Eyre, C. B.

The following gentlemen were named for ballot at the next meeting :—

F. R. Mallet, Esq., proposed by Mr. J. G. Medlicott, seconded by Mr. Atkinson.

R. L. Martin, Esq., inspector of schools, proposed by Mr. Atkinson, seconded by Mr. Leonard.

Communications were received—

1. From Major Walker, an extract of a report from the Civil Assistant in charge of the Assam Longitudinal Series G. T. Survey, to the Superintendent of the G. T. Survey.

2. From the President, extracts from reports by Mr. J. H.



O'Donel, the Arrakan surveyor, and by Mr. H. J. Reynolds, the Superintendent of survey on the Eastern frontier of Sylhet, containing interesting information regarding some little known tribes inhabiting in those regions.

These papers and the preceding one were read by Colonel Thuillier, who added some interesting remarks on the present state of our geographical knowledge of the districts on the Eastern frontier of Bengal.

The papers will appear in the Journal.

3. From Dr. J. L. Stewart, a memorandum on the Peshawur Valley, chiefly regarding its Flora.

4. From Dr. T. Anderson, a paper on the Flora of Behar, and the mountain Parasnath, with a list of the species collected by Messrs. Hooker, Edgeworth, Thomson and Anderson.

5. From E. Blyth, Esq., a further note on Wild Asses and alleged Wild Horses.

6. From Captain J. G. Forlong, a report with plans and drawings on the Isthmus of Krau, prepared by Captain Fraser and himself.

7. From Rev. I. Loewenthal, a paper on the antiquities of the Peshawur district.

Mr. Bayley after reading the paper, illustrated it by remarks with reference to similar discoveries at "Jamal Giri" described in Vol. XXI. of the *Journal* for 1852, and added some observations on the extract from Major Burrough's letter given by Mr. Loewenthal.

The papers will appear in the Journal.

8. From Baboo Gopinath Sen, abstracts of Meteorological Observations taken at the Surveyor General's Office, in May and June last.

The Librarian submitted the usual monthly report.

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The following additions were made to the Library since the meeting in July.

*Presented.*

The Annals of Indian Administration, Part 2 of Vol. VI. for June, 1862.

—BY THE BENGAL GOVERNMENT.

The Calcutta Christian Observer for July and August.—BY THE EDITORS.

Clifford's Memorandum of Timber of Bengal.—BY THE EDITOR.

Rational Refutation of Hindu Philosophy.—BY PUNDIT NEHEMIAH NIL KANTH AND TRANSLATED BY MR F. E. HALL.

Journal of the Statistical Society of London for June, 1862.—BY THE SOCIETY.

A Letter on the subject of the Translation of Scriptures into English from Tamil language.—BY THE

A Legend of Khoolneah, pamphlet by Mr. H. J. Rainey.—BY THE AUTHOR.

Memoirs of the Geological Survey of India, Vol. IV. Part 1.—BY THE BENGAL GOVERNMENT.

Memoirs of the Geological Survey of India, Palæontologia Indica, Vol. II. Part 2, 2 copies.—BY THE GOVERNMENT OF INDIA AND THE BENGAL GOVERNMENT.

The Oriental Baptist for June.—BY THE EDITOR.

The Oriental Christian Spectator for May.—BY THE EDITORS.

The Proceedings of the Royal Society of London, Vol. XII. No. 49.—BY THE SOCIETY.

Report on the Survey Operations of the Lower Provinces for 1861.—BY THE BENGAL GOVERNMENT.

Selections from the Records of the Govt. North-West Provinces, No. 36.—BY THE GOVERNMENT NORTH-WEST PROVINCES.

Selections from the Records of the Government of Punjab and its Dependencies, Vol. VI.—BY THE PUNJAB GOVERNMENT.

Statement of the Weekly Meteorological Returns of the North-West Provinces from June 1860, to May 1861.—BY THE GOVERNMENT NORTH-WEST PROVINCES.

Etudes Quelques Orthopteres des Musee de Geneve. By Henri de Saussure.—BY THE AUTHOR.

*Exchanged.*

The Athenæum for May.

The Philosophical Magazine, Nos. 156 and 157.

*Purchased.*

The observation of Sir Richard Hawkins, Kt., in his voyage into the South Sea in 1593—Edited by Captain C. R. Drinkwater Bethune, R. N., C. B.

Select letters of Columbus with original documents relating to the discovery of the New World—Translated and edited by R. H. Major, Esq., of the British Museum.

The discovery of the Empire of Guiana, by Sir Walter Raleigh, Kt., edited with copious explanatory Notes and a Biographical Memoir by Sir Robert H. Schomburgk, Phil. D., etc.

Sir Francis Drake his voyage 1595, by Thomas Maynarde, together with the Spanish account of Drake's attack on Puerto Rico, edited from the original MSS. by W. D. Cooley, Esq.

Narratives of early voyages undertaken for the discovery of a passage to Cathaia and India, by the North West, with selections from the Records of



the worshipful fellowship of the merchants of London, trading into the East Indies; and from MSS. in the Library of the British Museum, published by Thomas Rundall, Esq.

The Historie of Travaile into Virginia Britannia expressing the Cosmographiæ and Commodities of the country, together with the manners and customs of the people gathered and observed as well by those who went first thither as collected by William Strachey, Gent: the first Secretary of the Colony. Edited by R. H. Major, Esq., of the British Museum.

Divers voyages touching the discovery of America and the Islands adjacent, collected and published by Richard Hakluyt, Prebendary of Bristol, in the year 1582. Edited with Notes and Introduction by John Winter Jones, Esq.

A collection of documents on Japan with a commentary by Thomas Rundall, Esq.

The discovery and conquest of Florida by Don Ferdinando de Soto. Translated out of Portuguese by Richard Hakluyt, and edited with Notes and an Introduction, by W. B. Rye, Esq.

Notes upon Russia, being a translation from the earliest account of that country, entitled *Rerum Moscoviticarum commentarii*, by the Baron Sigismund Von Herberstein, ambassador from the Court of Germany to the Grand Prince Vasiley Iranovich in the years 1517 and 1526, two Volumes. Translated and edited with Notes and an Introduction by R. H. Major, Esq. Vols. I. and II.

The Geography of Hudson's Bay, being the remarks of Captain W. Coats, in many voyages to that locality, between the years 1727 and 1751, with an appendix containing extracts from the log of Captain Middleton, on his voyage for the discovery of the northwest passage in H. M.'s "Furnace," in 1741-42. Edited by John Barrow, Esq., F. R. S., F. S. A.

Three voyages by the North-East towards Cathay and China undertaken by the Dutch in the years 1594, 1595 and 1596, with their discovery of Spitzbergen, their residence of ten months in Novaya Zemlya, and their safe return in two open boats, by Gerrit de Veer. Edited by C. T. Beke, Esq., PH. D., F. S. A.

The history of the great and mighty kingdom of China and the situation thereof, compiled by the Padre Juan Gonzalez de Mendoza, and now reprinted from the early translation of R. Parke. Edited by Sir George T. Staunton, Bart., with an Introduction by R. H. Major, Esq., 2 Vols.

The world encompassed by Sir Francis Drake, being his next voyage to that to Nombre de dios, collected with an unpublished MS. of Francis Fletcher, Chaplain to the expedition. With appendices illustrative of the same voyage, and Introduction by W. S. W. Vaux, Esq., M. A.

The history of the Tartar conquerors who subdued China, from the French of the P<sup>re</sup> D'Orleans, 1688. Translated and edited by the Earl of Ellesmere with an Introduction by R. H. Major, Esq.

A collection of early documents on Spitzbergen and Greenland, consisting of a translation from the German of F. Marten's important work on Spitzbergen, now very rare; a translation from Isaac de la Peyr<sup>re</sup>'s relation de Groenland, and a rare piece entitled God's Power and Providence showed in the miraculous preservation and deliverance of eight Englishmen, left by mischance in Greenland, Anno 1630, nine months and twelve days, faithfully reported by Edward Pelham. Edited with notes, by Adam White, Esq.

The voyage of Sir Henry Middleton to Bantam and the Maluco Islands. From the rare edition of 1606, edited by Bolton Corney, Esq.

Russia at the close of the sixteenth century comprising "The Russe Commonwealth" by Dr. Giles Fletcher and Sir Jerome Horsey's travels, now first printed entire from his MS. in the British Museum. Edited by E. A. Bond, Esq.

The travels of Girolamo Benzoni, in America in 1542—56. Translated and edited by Admiral W. H. Smyth, F. R. S., F. S. A.

India in the fifteenth century, being a collection of narratives of voyages to India in the century preceding the Portuguese discovery of the Cape of Good Hope; from Latin, Persian, Russian and Italian sources now first translated into English, edited with an Introduction by R. H. Major, Esq., F. S. A.

Narrative of a voyage to the West Indies and Mexico, in the years 1599—1602, with maps and illustrations, by S. Champlain. Translated from the original and unpublished MS. with a Biographical notice and notes by Alice Wilmere. Edited by Norton Shaw.

Expeditions into the valley of the Amazons during the sixteenth and seventeenth centuries; containing the journey of Gonzalo Pizarro, from the Royal commentaries of Garcilasso Inca de la Vega; the voyage of Francisco de Orellana, from the General History of Herrera; and the voyage of Cristoval de Acuna, from an exceedingly scarce narrative written by himself in 1641. Edited and translated by Clements R. Markham, Esq.

Early indications of Australia; a collection of documents shewing the early discoveries of Australia to the time of Captain Cook. Edited by R. H. Major, Esq., F. S. A.

The embassy of Ruy Gonzalez de Clavijo to the Court of Timour, 1403—6. Translated, with notes, a preface and an Introductory life of Timour Beg, by Clements R. Markham, Esq., F. R. G. S.

Henry Hudson the Navigator. The original documents in which his career is recorded, collected, partly translated and annotated with an introduction, by George Asher, Esq., LL. D.



The expedition of Ursua and Aguirre, in search of El Dorado and Omagua, A. D. 1560-61, translated from the "Sexta Noticia historial" of Fray Pedro Simon, by W. Bollaert, Esq., with an Introduction by C. R. Markham, Esq., 1861.

The Annals and Magazine of Natural History for June.

The American Journal of Sciences and Arts for May.

Bleeker's Atlas Ichthyologique des Indes Orientales Neerlandisch, parts 1 and 2.

Deutsches Worterbuch Vol. III. part 7.

Enault's Histoire de la litterature des Hindous.

The Parthenon, Vol. I. Nos. 3 to 7.

The American Journal of Sciences and Arts, Vol. XXXIII. No. 99.

Revue des Deux Mondes for 15th May and 1st June.

Reeve's Conchologia Iconica, parts 218, 219.

Vendidad Sadi, part 8.

Wilson's works, edited by Rost, Vol. I.

Comptes Rendus, Vol. LIV. Nos. 17 to 19.

Journal des Savants for May, with an Index of the Vol. for 1861.

LALGOPAL DUTT.

6th August, 1862.

#### FOR SEPTEMBER, 1862.

The Monthly General Meeting of the Asiatic Society of Bengal was held on the 3rd instant.

A. Grote, Esq., President, in the chair.

Presentations were received—

1. From the Hon'ble G. F. Edmonstone, several statues and inscribed bases of columns of red sandstone from the remains of a monastery lately discovered in one of the ancient mounds outside the city of Muttra. One of these inscriptions records the name of Huvishka, who has been identified with the Indo-Scythian King Hushka.

On the proposal of the President, the thanks of the Society were voted to Seth Luchmee Chand, and to Mr. Palmer, the East India Railway Agent, for having kindly undertaken to bring them down to Howrah on account of the Society.

2. From Mr. E. B. Cowell, a copy of the Uttara Rama Charita, edited by Pundit Premchand Tarkabágisa.

3. From Babu Rungolal Banerjea, through Babu Rajendralal Mitra, a copy of a poetical work entitled Karma Devi.

4. From Mr. D. H. Macfarlane, a silver coin of Shere Shah found near a temple in the Tirhoot district. The inscription is in Arabic and Devanagari letters, dated A. H. 951.

The President exhibited two silver coins found in lot 211 belonging to Babu Siva Chandra Mullick in the Sunderbuns, forwarded for that purpose by the Commissioner, Sunderbuns, who writes, "I visited the lot in February last, and was agreeably surprised to observe several extensive tanks and heaps of bricks and mounds of earth, also the remains of a road, thereby clearly indicating that the place was once inhabited by men in opulent circumstances."

The coins were those of Ghyasoodeen Bulbun, dated 673 A. H. apparently struck in Bengal, and of Nasiroodeen Mahamood. The President expressed a hope that he would be able to exhibit the whole trove consisting of 38 coins.

A circular vessel said to be of Jade enclosing a crystal duck and gold leaf inscription, received from Mr. C. Westropp, of Rawal Pindee, was also exhibited (*vide supra*, p. 167).

The nomination of Babu Ramá Nauth Tagore to be a member of the Council, *vice* late Babu Ramapersaud Roy was confirmed.

The following gentlemen duly proposed at the last meeting were balloted for and elected ordinary members.

F. R. Mallet, Esq.

R. L. Martin, Esq.

The following gentlemen were named for ballot at the next meeting:

Raja Apurva Krishna, proposed by the President, seconded by Babu Rajendralal Mitra.

Babu Pulin Behary Sen, proposed by Babu Gourdoss Bysack, seconded by Babu Rajendralal Mitra.

The Hon'ble H. B. Harington, proposed by Capt. W. N. Lees, seconded by the President.

J. T. Wheeler, Esq., proposed by Mr. E. C. Bayley, seconded by the President.

C. C. Stevens, Esq., C. S., R. H. Wilson, Esq., C. S., and Valentine Irwin, Esq., C. S., were proposed by Capt. W. N. Lees, and seconded by Mr. Cowell.

C. S. Hogg, Esq., proposed by Colonel Thuillier, seconded by Mr. Wyllie.



C. Bernard, Esq., C. S., proposed by Captain Hyde, seconded by Colonel Thuillier.

Communications were received—

1. From Colonel A. P. Phayre, a note on a Burmese inscription from Pagan.

2. From the same, a note on some Tenasserim medals and coins.

3. From Babu Rajendralal Mitra, a paper on the Bhoja Raja of Dhárá and his Homonyms.

4. From Babu Gopi Nauth Sen, Abstracts of the Meteorological Observations taken at the Surveyor General's office in July last.

E. C. Bayley, Esq. read Colonel Phayre's paper, on the Pagan inscription, and Babu Rajendralal Mitra read his own paper on the Bhoja Raja.

The thanks of the meeting were voted for each communication. Both will appear in the Journal.

The Librarian submitted the usual monthly report.

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The following are the accessions to the Library since the meeting held in August.

*Presented.*

Annual Report of the Grant Medical College of Bombay for 1861-62.—BY THE PRINCIPAL OF THE COLLEGE.

The Calcutta Christian Observer for September.—BY THE EDITORS.

Catalogue of Economic products of the Bombay Presidency.—BY THE BENGAL GOVERNMENT.

Catalogue Codicum Orientalium.—BY THE LUGDUNI BATAVORUM ACADEMY.

Indian Annals of Medical Science, No. XIV.—BY THE EDITOR.

The Infant Treatment, 2nd Part.—BY THE AUTHOR.

Journal Asiatique, Vol. XIX. No. 74.—BY THE PARIS SOCIETY.

Journal of the Academy of Natural Sciences of Philadelphia, Vol. V. Part 1.—BY THE ACADEMY.

Journal Royal Asiatic Society of London, Vol. XIX. Part 4.—BY THE SOCIETY.

Jahrbuch, Vol. XII. No. 1.—BY THE VIENNA ACADEMY.

Journal of Sacred Literature and Biblical Record, No. 2, New Series.—BY THE EDITORS.

Karma Devi or the Rajput Wife.—BY THE AUTHOR.

The Madras Journal of Literature and Science, Vol. VI. No. 12.—BY THE MADRAS SOCIETY.

Natuurkundig Tijdschrift voor Nederlandsch Indie, Deel. XXIV.—BY THE BATAVIAN SOCIETY.

The New Civil Guide, Part 2.—BY BABU KISSORY CHAND MITRA.

The Oriental Baptist for July.—BY THE EDITOR.

The Oriental Christian Spectator for June.—BY THE EDITOR.

The Proceedings of the Academy of Natural Sciences of Philadelphia, pp. 145—556.—BY THE ACADEMY.

Schriften der Koniglichen Academy der Wissenschaften, Vol. II. Parts 1 and 2.—BY THE VIENNA ACADEMY.

Uttara Râma Charita, Edited by Pandita Prem Chandra Tarkabâgisa.—BY E. B. COWELL, Esq.

Bhaminee Bilâsa, Part 2.—BY THE SAME.

*Exchanged.*

The Athenæum for June.

The Philosophical Magazine, No. 158.

*Purchased.*

The Annals and Magazine of Natural History for July.

Bohtlingk and Roth's Sanskrit Worterbuch, Bogen 1—10.

Bleeker's Atlas Ichthyologique des Indes Orientales Neerlandisch, Part 3.

Goeje's Memoires de Histoire et de Geographie Orientales, No. 1.

Hewitson's Exotic Butterflies, Parts 19 to 43.

The Natural History Review for July.

The Numismatic Chronicle and Journal of the Numismatic Society of London, New Series, No. 6.

The Parthenon, Vol. I. Nos. 8 to 11.

Revue des Deux Mondes for 15th June.

Revue et Magasin de Zoologie, No. 5 of 1862.

Reeve's Conchologia Iconica, Parts 220 and 221.

The Westminster Review for July.

Westergaard's Indischen Geschichte.

Comptes Rendus, Vol. LIV. Nos. 20 to 25.

Journal des Savants for June.

LALGOPAL DUTT.

3rd September, 1862.



## FOR OCTOBER, 1862.

The Monthly General Meeting of the Asiatic Society of Bengal was held on the 8th instant.

E. C. Bayley Esq., in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From the Count D'Escayrac De Lauture, a copy of his work on the telegraphic transmission of the Chinese characters.

2. From the Secretary, Batavian Academy, several numbers of the *Verhandlingen* and *Tijdschrift* of the Academy.

3. From Lieut.-Col. R. C. Tytler, numerous skulls of the small wild pig of the Andaman Islands; also of the edible and Hawk's-bill Turtles, the lower jaw of an adult Dugong, and some bones of fishes.

A letter from Rev. F. F. Mazuchelli, intimating his desire to withdraw from the Society, was recorded.

The following gentlemen, duly proposed at the last meeting, were balloted for and elected ordinary members:—

Raja Apurva Krishna Bahadoor.

Babu Poolin Behary Sein.

The Hon'ble H. B. Harington.

J. T. Wheeler, Esq., C. S.

C. C. Stevens, Esq., C. S.

R. H. Wilson, Esq., C. S.

Valentine Irwin, Esq.

C. S. Hogg, Esq., and

C. Bernard, Esq.

The Council recommended that the following report of the Philological Committee should be adopted.

The Philological Committee recommened that the *Tabakát-i-Násari* of Abu Umar al Juzjani, should be published in the Persian series of the *Bibliotheca Indica*.

We have already published its continuation by *Zia-i-Barni* and the two works together will form a most valuable contribution to Indian history. Mr. Morley in his catalogue says, that the *Tabakát-i-Násari* is exceedingly valuable in reference to the intricate history of the Ghúrides and of the Slave Kings of India and of their Viceroys and Governors; so far as it extends, it is the best authority for the

events of that interesting period. Captain Lees has undertaken to edit the work; it will occupy about seven Fasciculi.

The report was adopted.

Communications were received—

1. From Major J. T. Walker, extracts from a report from the Superintendent, Great Trigonometrical Survey, to the Secretary to the Government of India, Military Department.

2. From Babu Rajendralal Mitra, a paper on two ancient Sanscrit Inscriptions from Central India.

3. From Herr E. Schlagintweit, a paper entitled “Translation and Tibetan text of a Tibetan address to the Buddhas of confession.”

4. A letter from Colonel Cunningham on the Buddhist discoveries at Sultanganj.

Mr. Bayley read the above. It was as follows :—

*Nynee Tal, 7th Sept. 1862.*

TO THE SECRETARY, ASIATIC SOCIETY.

DEAR SIR,—In reply to your letter regarding Mr. Harris's discovery of some Buddhist remains near Sultanganj, I beg to say that there seems to me every probability that the complete excavation of the ruined buildings would well repay the cost of the work. I have received from Mr. Harris a plan of the ruins, as far as they have been excavated, and I am able to state decidedly that they are the remains of an ancient *Vihār*, or Buddhist chapel-monastery. The *Vihār* always included a temple or shrine, containing a figure of Buddha; and in the present case the enshrined figure has already been discovered. Around the shrine were the cells of the resident monks, who conducted pilgrims to all the holy spots, and retailed the legends connected with them. Six cells have already been uncovered by Mr. Harris. These six cells cannot form more than one-sixth or perhaps only one-eighth of the whole number. The cells are always disposed on the four sides of a square; and I would therefore recommend that the first operation should be to dig a narrow trench along the course of the inner wall, in order to determine at once the shape and extent of the mass of buildings.

In Mr. Fergusson's *Hand Book of Architecture* you will find several plans of *Vihār* caves, excavated in the solid rock. In all these examples, the cells necessarily occupy only three sides of the square, the fourth side being required for the admission of light.



My reason for believing that the continuance of the excavations will well repay the cost of the work, is chiefly founded on the discovery of the colossal copper image of Buddha; and on the unmutilated state of the other images and inscriptions. From these discoveries, I conclude that the resident monks had only just time to bury the colossal copper statue of Buddha, before making their escape from the *Vihár*, and consequently that numerous objects of interest must have been abandoned by them. Mr. Harris does not mention whether there are any traces of fire; but I infer from the perfect state of the copper statue, that fire was not the means of destruction of the Sultanganj *Vihár*. At Sarnath, Benares, all the metal objects discovered by Major Kittoe and myself had been wholly or partially fused, and the grain found in the cells was all charred.

I am indebted to the courtesy of Mr. Harris for a copy of one of the inscriptions discovered by him on the back of a small stone figure. The inscription itself is of no value, it being only the usual Buddhist formula, beginning with *Ye Dharmma hetu prabhava*, &c., but it is otherwise of value, as the forms of the letters show that the figure is of early date, most probably of the second or third century.

I have delayed answering your letter in the hope of being able to find some mention of this *Vihár* either in *Fa Hian* or in *Hwen Thsang*; but I have been disappointed. The latter pilgrim describes *Champa*, (the modern Bhagulpore) and it is probable that the Sultanganj *Vihár* is one of the "several dozens of monasteries" which were then mostly in ruins. This is rendered still more probable by the early date of the inscription noticed above.

If I am right in my conjecture that the Sultanganj *Vihár* is one of the many that were in ruins in the seventh century when visited by *Hwen Thsang*, it will only be the greater inducement to continue the excavations, as the objects which may be brought to light will belong to an early period of Buddhism, probably anterior to the introduction of the five *Dhyán* Buddhas and Bhodi Satwas, who were the principal objects of reverence at the time of *Hwen Thsang's* pilgrimage.

The characters of the inscriptions sent to me by Mr. Harris are of the same age as those of the Gupta dynasty. The principal determinative letters are the Y and the sr, which in the inscriptions of later date, say of the 7th and 8th centuries, have changed to

another form. A reference to Mr. Bayley regarding the probable age of the inscriptions in which the earlier forms of these letters are found, will at once satisfy you that I am right in assigning the occupation of the Sultanganj *Vihār* to an early date.

I am, &c.,

(Sd.) A. CUNNINGHAM.

5. A letter from Babu Guru Churn Doss, containing an account of an old mosque situated in Pergunnah Habibe, with specimens of bricks of the mosque forwarded through Babu Gour Doss Bysack.

The Secretary read the above. The letter is subjoined:—

TO THE SECRETARY OF THE ASIATIC SOCIETY, CALCUTTA.

*Berhampore, 22nd September, 1862.*

SIR,—During one of my official tours in the district of Jessore, I visited a very old and curious mosque about two miles to the east of a small bazar called Bunghat, in Pergunnah Habibe, and although not surrounded with very great interest, yet the fact of its having been built in the time of the great Akber in such an out-of-the-way place is not quite unworthy of notice.

The mosque is said to have been built by one Khwajah Ally Khan, who came down from Delhi and took up his residence, it is impossible to say for what length of time, in that part of Jessore, where it now stands. Besides this mosque, there are other buildings about a mile's distance from it, but they are all either overgrown with jungles, or are in too great ruins to admit of my determining their exact nature and form; one of which, however, I was told, goes under the name of *Satgoombuz*, meaning sixty pyramidal roofs, which was the palace of Khwajah Ally Khan. In the neighbourhood of this there are several other buildings apparently in ruins, but the general aspect of which leads one to imagine that this locality was once, no doubt, a scene of magnificence. Traces of broad and strongly metalled roads are yet to be seen in almost every direction of the mosque from the *Satgoombuz*, thereby affording grounds for believing that the Sunderbuns shroud the ruins of once populous and flourishing towns.

Although the mosque and two other small buildings in its close vicinage were not very seriously damaged when I visited them, they were much out of condition. The entrance door of the mosque is towards the west. The material consisted of small but very strong bricks nicely cut and beautifully put together with mortar. The



structure in fact is very solid, and the floor is inlaid with beautifully small square and hexagonal bricks, the surface of which, however, is variegated and enamelled.

In the interior, save and except a tomb of ordinary elevation on rather an oblong base, a very large slab of white marble on which some couplets of the Koran are engraved in gilded characters, and placed upon an artificial raising, and the wood-work of the door, there is nothing else to attract notice.

In the front of the mosque there is a large tank, equal if not larger in size than that in the *Dilkush Baug* of the Rajah of Burdwan, and containing not a small number of alligators of different size. The whole of the space attached to the buildings and surrounding the tank is enclosed by walls of ordinary height.

I have found some difficulty in obtaining any authentic account of Khwajah Ally's mission to Bengal, nor could I discover why he was induced to fix his residence at a locality beset by so many disadvantages.

The bricks which I had taken out from the mosque have been handed over to Babu Gour Doss Bysack, for presentation to your Society.

I remain, &c.,  
(Sd.) GURU CHURN DOSS.

The Librarian submitted the usual monthly report.

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The following books and periodicals were added to the Library since the September meeting.

*Presented.*

Annual Report on the Administration of the Bengal Presidency.—BY THE BENGAL GOVERNMENT.

A Work on Telegraphic Transmission of the Chinese characters. By the Count D'Escayrac de Lauture.—BY THE AUTHOR.

Memorandum on the Panchouttee or Indian Gutta of the Western Coast.—BY LIEUT.-COL. C. DOUGLAS.

Report on the Hyderabad Assigned Districts for 1861-62.—BY THE BENGAL GOVERNMENT.

Report on the Administration of Port Blair for 1861-62.—BY THE SAME.

Sakuntala, edited by Pandita Prem Chandra Tarkabágisa.—BY E. B. COWELL, ESQ.

Selections from Records of the Madras Government for 1860.—BY THE MADRAS GOVERNMENT.

Transactions of the Government of India, Military Department for 1861-62.—BY THE GOVERNMENT OF INDIA.

Zijdschrift voor Indische Zaal-land en Volken kunde, Vols. VII. VIII. IX. and X.—BY THE BATAVIAN ACADEMY.

Verhandlingen van het Bataviasch Gentooschap, Vols. XXVII. and XXVIII.—BY THE BATAVIAN ACADEMY.

*Purchased.*

Kádamvari.

Masnavi Khizar Khan wa dawal Rani.

Molla Nany.

Nizami's Sekander Nameh.

LALGOPAL DUTT.





88°

88° 30'

T H I B E T

SKETCH MAP

Shewing the **Glaciers** at the Source of the

**RATONG RIVER**

to illustrate the Notes upon a trip undertaken by

**Major James Lind Sherwill, Rev. Surveyor.**

to explore the Snowy regions of the

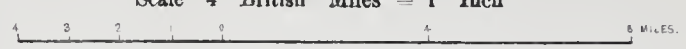
**GREAT KUNCHINJINGA GROUP**

in the

**Himalayah Mountains.**

**1861.**

Scale 4 British Miles = 1 Inch

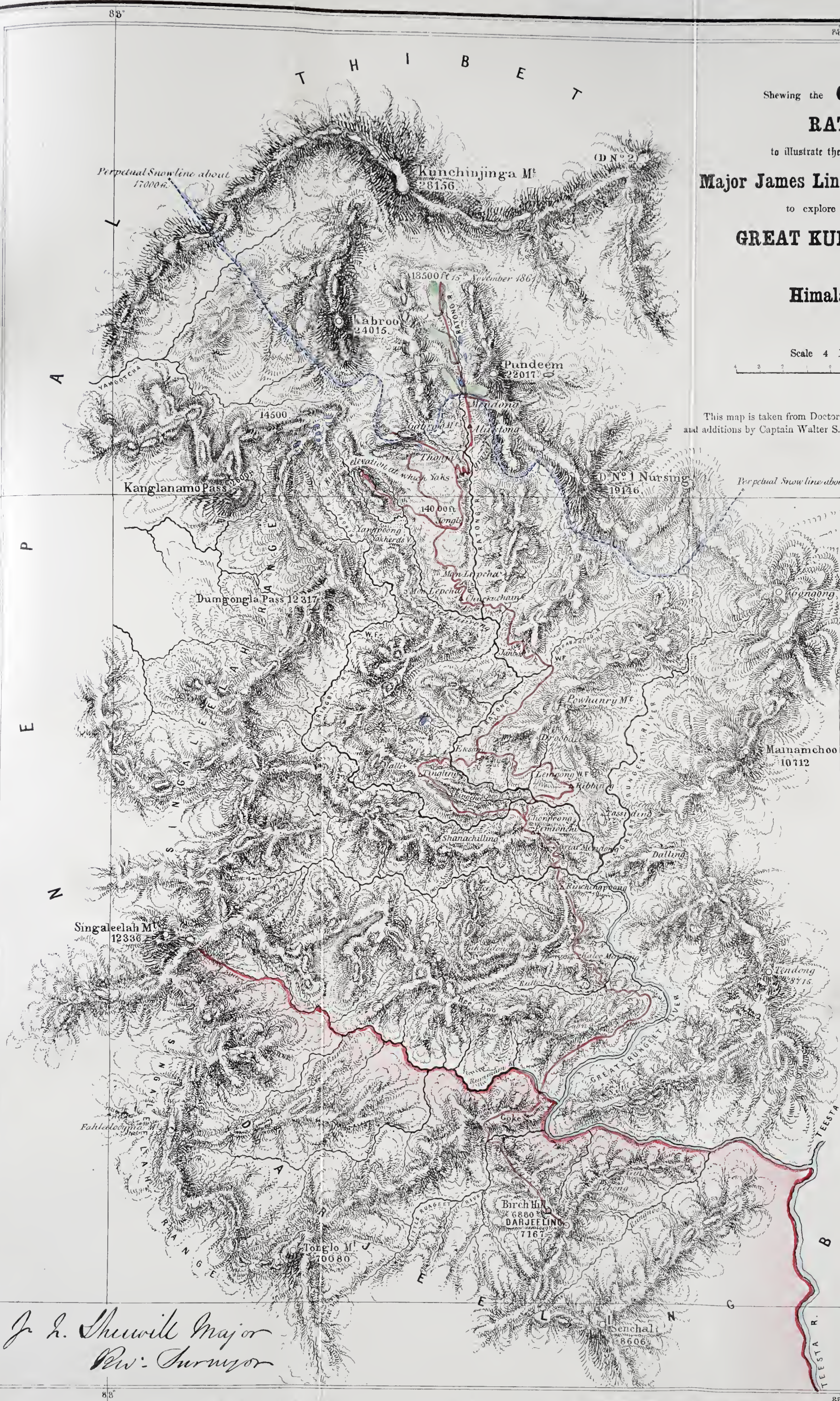


NOTE.

This map is taken from Doctor J. D. Hooker's map of Sikkim, with corrections and additions by Captain Walter S. Sherwill and Major James L. Sherwill.

Perpetual Snowline about 17000 ft.

Perpetual Snowline about 17000 ft.



REFERENCES.

- Glaciers with containing Morains
- Goompas, or Llama Monasteries
- Halting places
- Water falls
- Heights ascertained by G. T. S of India
- British Boundary
- Major James Sherwill's route

*J. L. Sherwill Major  
Rev. Surveyor*







# JOURNAL

OF THE

# ASIATIC SOCIETY.

No. V. 1862.

*Journal of a Trip undertaken to explore the Glaciers of the Kanchunjingah Group in the Sikkim Himalaya, in November 1861.—By Major J. L. SHERWILL, Revenue Surveyor.*

The rains had been protracted to a later date than usual. On the 2nd November, 1861, after a week of fair weather, on the morning of one of those balmy days for which, at this season of the year, Darjeeling is so famous, our party, consisting of Dr. B. Simpson, Bengal Army, Captain E. Macpherson, 93rd Highlanders, W. Kemble, Bengal Civil Service, and myself, left "The Bright Spot" with the view, if practicable, of reaching and ascending any one of the perpetually snow-elad spurs of the great Kanchunjingah group of mountains, and examining the glaciers of this hitherto unexplored portion of the great Himalaya range. From Dr. Hooker's published map of Sikkim we were led to hope our object would have been attained by following the course of the Ratong river to its source. Accordingly we decided upon following this route, being strengthened in our resolution, by knowing that Captain W. S. Sherwill, in 1852, had failed in reaching *The Big Mountain* by continuing along the crest of the Singaleelah Range, his further progress having been stopped by a deep and precipitous valley.

Leaving Darjeeling at 7.45 A. M. on our hill ponies, we passed the Little Rungeet at 10 A. M. over a good bridge made of bamboos lashed together with slips of cane, forming an arch supporting a pendent roadway which was constructed in one night by Murray's sappers for the late Lady Canning. Reached the frontier outpost of Goke, at

10.30 A. M. It is situated on the summit of a narrow range which separates the Little Rungeet from the Rummàn, which river here forms the boundary between British and Independent Sikkim.

We parted with our ponies at Goke and proceeding on foot in an easterly direction, reached the Rummàn at noon, which river we crossed, not very far from its junction with the Great Rungeet, by a well constructed bridge of bamboos. The luxuriance of the vegetation along the northern slopes of the Goke spur is beyond all description beautiful. Near Goke are groups of stately saul trees, elegantly covered with clusters of ferns—one kind in particular encircles the saul, forming coronet-like bunches one above the other, the broad leaves of the fern resembling the feathers of a shuttlecock. On one tree we counted eleven of these coronets rising one above another. Towards the Rummàn, at a lower elevation, we passed through a grove of gigantic bamboos about a mile in extent. These bamboos are commonly used by the hill people for carrying water. Mica schist exists in considerable quantity along the spur, and the soil is rich and deep. Proceeding onwards and taking a northerly direction, we doubled round the Chakoong hill, and reached the Ruttoo at 3 P. M. which we mistook for the Rishee. Crossing the Ruttoo by a couple of stout saplings thrown across this wild and very pretty torrent, we commenced the ascent of the Rishee spur of the Hee mountain. Here one of our party became quite knocked up by the long and fatiguing walk, but after despatching the best part of a tin of marmalade, was sufficiently recovered to proceed and mount the remainder of the steep acclivity and descend the other side as far as the Rishee cultivation, where we arrived at 6 P. M. after a harassing march of twenty-seven miles, and encamped at an elevation of about 1000 feet above the bed of the river. We found all our things, which had been sent on ahead two days previously, were up and tent pitched. The road which was marked out last year by the sappers, during the temporary occupation of this part of Sikkim, was in pretty good order. It is called by the natives the lower and level road, to distinguish it from that viâ Siriong and upper Rishee, which has many long ascents and descents.

Early next morning the villagers brought us supplies and oranges from Mixidong, for which we paid. After an early breakfast, left Rishee at 8 A. M. and descended to the Rishee river, which was cross-



ed by a bridge made of saplings ; hence we ascended the Rinchingpoong hill, the lower part of which is rocky and steep, but the upper portion is less so, and the road a made one and good. Passed a good deal of millet cultivation, and stopped with a view to procure some of the well known beverage made from the millet seed, called "Murwa," but the villagers all ran away. We reached Rinchingpoong about 12.45 P. M. and pitched our tent immediately above the site of the field entrenchment occupied last year by Dr. Campbell and Captain Murray's party of sappers. A few trenches, broken planks, pieces of posts strewed about, and the skull of a Bhootia pierced by a bullet, alone mark the spot, where our countrymen, the year previous, withstood the treacherous attack of twenty times their own number. If this portion of Sikkim should ever become British territory, this hill is deserving of particular attention, as possessing great capabilities for the formation of a winter sanitarium. The southern extremity of the hill is about 7000 feet, but the northern, where the village site exists, is not more than 5,600 feet, and the temperature is much milder than that of Darjeeling. The soil is deep and rich, mica schist entering largely into the composition of the hill. It has several good perennial streams, a large pool of water, and broad terraces on all sides. Carriage roads might easily be constructed. The distance from Darjeeling by the lower road is about thirty-five miles. Wheat, millet, rice, buck wheat, &c., are cultivated. Crabb apples, raspberries and cherry trees were observed, the latter in full blossom, whilst most of the other trees were shedding their leaves. The daphne or paper-tree also grows here, likewise oak, magnolia, birch, chesnut, walnut and many other forest trees.

There is a Goompa at this place well worth seeing, the Llama belonging to which died nine months ago.

The Llama's widow and relatives brought us a present of four bamboo tubes of hot "Murwa," and later in the evening eggs, rice, milk and fowls ; and in the morning more rice for sale, also eggs, milk and millet seed. Our encampment, which was in the midst of very high wormwood, swarmed with hairy caterpillars, which crawled over our beds and up the sides of the tent, and were very troublesome.

The morning was very fine, and having breakfasted early, we were ready for a start, but delayed on account of the coolies who had no rice till this morning's supply arrived.

Left Rinchingpoong at 9 A. M.; passed Soomtong at 9.30; and after two hours of steep descent reached the broad and rapid stream of the Kullait, close to where the Rongsong stream falls into it. Here we had a refreshing bathe and washed clothes. The Kullait is here divided into two streams. The first and smaller was crossed by a slender bridge made of bamboos, having a pendent roadway formed of a single bamboo. Across the second the fishermen have constructed a very ingenious weir of bamboos tied together with cane. During the night, when the fish descend the rapids, they are driven by the force of the water on to an open frame-work of bamboos where they are easily captured. The fishermen cooked some fish by baking or stewing them in a bamboo, a device which succeeded admirably and occupied only a few minutes. We boiled water and made murwa; and having scrambled across the second stream by the aid of the fisherman's weir, by 1 P. M. were wending our way up the very steep Pemionchee hill on the north side of the valley, and at 3.45 P. M. reached Gazing, and the coolies an hour later. We put up in the house of a villager, and were shortly afterwards treated to murwa and plantains by a sturdy Llama with a peculiar drooping eyelid. All our beds were placed in a row, and dinner was served up on an extempore table formed of a plank taken from the flooring. In front was a flaring fire, surrounded by a dozen people of all ages and both sexes, principally the members of our host's family, besides some of our own coolies, including the cook and his deputy. All the members of the family had their heads shaved on account of the recent death of an old servant. After dinner we had singing, but it was not without some difficulty that we persuaded the Bhooteas to favour us. The Llama, who was in grief, sat apart in one corner of the spacious apartment constantly mumbling his prayers, but after partaking of two cups of tea and a cheroot, he was induced to join the social party round the fire. A Dowager Llama was very seriously engaged in her devotions with a praying cylinder the whole time. On breaking up festivities we went to bed, exposed to the gaze of all the fair inmates, who after seeing us comfortably settled for the night modestly retired. But I may as well mention that we had by this time relinquished the vulgar fashion of undressing before retiring to rest. Our slumbers were frequently disturbed by the barking of dogs, squeaking of pigs, and squalling of children. The latter we found in the



morning were without clothing, which may account for their restlessness.

Breakfast over, and after attempting to eat some hard cakes made of crushed Indian corn, cemented with some farinaceous matter, we left for Pemionchee at 8 A. M.; and after a steep ascent reached the Rajah of Sikkim's unfinished durbar at 9 A. M. This durbar was only begun last year, and during the troubles in Sikkim remained untouched, and is now in abeyance until the Pemionchee Monastery is renovated. At present only two stories have been built. As far as it goes, it is a very substantially constructed mansion, 36 × 46 feet. The walls are 5 feet in thickness and of solid masonry, and the floor of the upper story is supported on massive beams and upright posts. It will be a fine building, when completed.

A further steep ascent of half an hour brought us to the Goompa at Pemionchee. This once extensive monastery is now a mass of ruins. It was accidentally burnt in October last year. The full complement of Llamas is 108. Of this number only twelve were present. The remainder were absent in all parts of the country, collecting money and materials for the rebuilding of their temple. Some of the latter, such as pigments and brushes for the painting of the figures of their gods and embellishment of the walls, are to come from China, the artists from Thibet, and other materials from Calcutta. We saw the villagers bringing in half wrought logs of wood from the surrounding forests.

It will take two years to rebuild, and probably as many more to embellish. The Llamas are very anxious to get it completed, as in its present state their occupation is gone. They complained that nobody visited them, a state of things very detrimental to their finances. Formerly they received a subsidy of Rs. 3000 annually from the Rajah of Sikkim, but since the Terai lands and the Darjeeling hills were annexed to British territory, this bounty has been discontinued. The Llamas are consequently poor, but like the monks of old are a fat and jovial race, their sleek faces indicating any thing but a poor larder. We put up in a house belonging to one of the absent Llamas. The head Llama, who is a perfect type of his holy order, treated us to murwa which was very refreshing. He and several other Llamas were sociable and talkative. They informed us that they had two days previously received instructions from the Dewan

at Darjeeling to lay in a supply of rice for us, but had not been able to do so, as very little rice had been cultivated, in consequence of the flight across the Rungeet of the majority of the cultivators during the recent disturbances. They could only supply one maund of rice, and three or four of Indian corn. But I soon found out that this was not the case, and that plenty of rice was forthcoming on making money advances for it, which I accordingly did, and had it sent after us, some as far as Jongli, and some placed in Caches at intermediate stations.

From Pemionchee, which is 7000 feet high, a fine view of the snow is obtained, also of the valley of the Ratong. The monastery of Chanacheeling is perched upon a high peak of the Pemionchee range to the westward, and at present is made the repository of all the books and other relics saved when the Pemionchee Goompa was burnt. Sinchul and Darjeeling are visible over the Kulloo Mendong twenty miles in direct distance.

This morning the weather was again very fine; the thermometer at sunrise stood  $48^{\circ}$ . Dr. Simpson photographed the snow, the Goompa and one of the Llama's houses. Left Pemionchee at 8.45 A. M.; and after a steep descent and rapid walk of 45 minutes reached the village of Chonpoong, consisting of about fifteen well built houses very pleasantly situated at the foot of a tree forest, on a rather flat terrace on a spur of the Pemionchee hill. It commands good views on three sides to the north. Eksum is seen in the foreground, looking very flat and having a quantity of cultivation round it. The deep and thickly wooded valley of the Ratong is conspicuous winding to the west, across which are plainly visible the fine waterfalls of Lemgong, dashing headlong down perpendicular walls of gneiss rock, over which a near view of the Nursing and Junnoo mountains is obtained, but Kanchungingah is depressed behind the Baraborony hill. To the east a high mountain in Sikkim is striking, and the monasteries of Raking and Tassiding, the latter perched upon a conical hill standing apart from all others. To the west, the distant view of the Singaleelah range, seen across the valley of the Ringbi, is very grand. Altogether the view from Chonpoong is striking and beautiful, but that of the snow is limited, and far less grand than that obtained from Darjeeling.

It was our intention to proceed direct to Eksum, which is the shortest road by several miles; but understanding from the villagers



that the bridges across the Ringbi and Ratong were broken, we were compelled to proceed by the long route viâ Tingling. So after partaking of murwa presented to us by the mundul or headman, and having made purchases of rice, fowls, eggs and butter, at 10.30 A. M. we resumed our march in a westerly direction. Having crossed through the Liebong cultivation and clearance, and making a rapid and very steep descent, we crossed the Ringbi by a bamboo bridge thrown across a deep narrow gorge, through which the whole body of the stream rushed with impetuosity, rolling and boiling over large blocks of gneiss rock. The Ringbi at this spot is very narrow, confined between steep rocky sides, the bed of which is full of deep pools of clear water. The ridge was not more than twenty feet in length, and the view of the river from it very wild. After a steep ascent and a slight descent we reached the Ringbi, here we bathed, washed clothes and had tiffin. Air 70°; water 56°.

Left the river at  $\frac{1}{4}$  to 2 P. M. and after a steep ascent of 40 minutes reached our halting-place at Tingling, altogether a distance of about eight miles. We put up in the house of the headman of the village, who very politely offered us his apartment on the floor of which our dinner was cooked. We turned in early, but what with the coughing and loud talking of our host's family, some of us did not get to sleep until near morning. There was an ill-natured cur at this place, who several times snarled and snapped at our heels.

We had not been in bed very long before a rumbling noise, not unlike the devotional murmurings of a Llama, was heard, which shortly increased in earnestness and became louder and louder. At last it was indistinctly heard to say, "that beast of a dog has got hold of my hand and won't let go, he has bitten my hand right through now;" and then the same voice was very distinctly heard to say, "I'll eat no more dinner, I was in a mortal funk, and could get no one to take the beast off, though I tried hard to do so." This was our friend Kemble who had evidently partaken freely of dinner, and was labouring under the effects of nightmare.

The Molee Goompa is immediately above Tingling on the summit of the Molee mountain. The Chanacheeling, Pemionchee, Tassiding, Rubolong, Gyratong, Doobdee and Kaichoopeenee Goompas are all visible from this place.

After having purchased some fowls and partaken of an early breakfast, we started at 8.30 A. M. and after fifteen minutes' steep descent passed the small village of Kasuppyah, consisting of two houses and some clearance for cultivation. The headman was waiting for us with presents of sugar-cane, murwa, eggs, plantains and milk.

Another quarter of an hour of steep descent brought us to Linchoogong, a small village of three houses. At 9.30, after a very steep, stony and difficult descent, we arrived at the Ratong, which is here a wild, foaming and boiling torrent, dashing over large blocks of gneiss rock. We halted till 11.30 bathed and washed clothes. The temperature of the water was 48°.

Dr. Simpson took two photographs of this wild spot, which unfortunately were afterwards destroyed. We crossed the torrent by a temporary bridge constructed by the inhabitants of the village of Labeeong, who also brought us presents of rice, murwa and eggs. After a steep scramble of a quarter of an hour, we met the inhabitants of the village of Paranting, who brought us hot murwa, and had prepared a place to sit down. They were particularly polite; the women were highly decorated with coral, amber and silver ornaments; both sexes wore flowers of a pretty blue hydraugea in their ears. Three of the women had jackets made of European long-cloth, dyed blue, but the children, as usual, were quite naked. After a further steep ascent we reached our halting-place at Eksum at 1 P. M. This is the frontier village, prettily situated on a broad plateau surrounded by high commanding mountains, most of which have their summits capped with fir trees, and their slopes richly clothed with deep verdure and stately forest trees. A few hundred feet above the village, to the east, the monastery of Doobdee is seen perched on the summit and at the extremity of a separate spur, in a very picturesque position. It is probably of very ancient origin, built by the first Buddhist priests who settled in Sikkim. Eksum derives its name from Ek or Yeuk which means a "labourer" or "workman," and "soom" three, from the first three Bhuddhist ministers who came into Sikkim from Thibet, having commenced their spiritual labours at this place.

We put up for the night in the house of a villager, the female members of which, on their return from the toils of the field, seemed not at all pleased at finding their house in the possession of strang-



ers, however, they soon became reconciled and appeared to take considerable interest in our culinary operations.

Our host had been a cripple for twenty-two years from the effects of a hatchet cut, but this did not deter him from soliciting medicine to cure him. The females all left before we turned in for the night, but mine host remained and drank whiskey toddy which made him very restless all night. We had most of us become very bad sleepers, and very little disturbed us, so what with mine host passing in and out and the fighting and incessant squeaking of young pigs under the floor, we got very little sleep.

As this is the last village towards the snow, the coolies wanted a halt which was not conceded. Before starting we purchased three maunds of rice, four fowls and some eggs, and distributed some glass beads and buttons amongst the members of our host's family, and presented a metallie snuff box to the Doobdee Llama, from whom we bought a yak for 12 Rupees. We left Eksum at 9.30. The first part of the road was good, but it soon became very bad. It lay along the side of an almost precipitous hill, where a false step would often have precipitated the traveller many feet headlong down the kudd towards the Ratong, the roaring of whose waters below was very audible. At 11 A. M., we passed the beautiful water-falls of Barabarong, dashing headlong down a precipice over immense blocks of gneiss in situ. The water was clear as crystal.

The ascent on the opposite side was very difficult: we were sometimes obliged to scramble upon all fours, at others to mount by steps cut in upright posts, or along saplings slung over precipitous parts. In a few places the yak herdsmen have cut foot-steps in the solid rock for the convenience of travellers, who would often find it difficult to proceed without such assistance. The hills are very precipitous, as is the case in all the back ranges near the snow in Sikkim. The range on which we were, was thickly covered with forest trees and underwood, it was only occasionally we obtained a peep at the noble capped mountain across the Ratong. We encamped in a very jungly place in the midst of forest, at a spot called Joaboo, near a small mountain torrent. We wished to go on a little further to Neebee, but were prevented, for want of water at that place. Although the whole distance was not more than seven miles, the march was a fatiguing one for the baggage coolies who arrived late in the evening. We all

assisted in cooking dinner. Cooking has become quite a pastime with us. We are now at an elevation for that troublesome and loathsome parasite, the Himalaya tick, which we have found rather abundant.

Started at 8.46 ; and after going over five or six miles of difficult road, reached the Ratong which is here the same foaming, boiling torrent. We crossed immediately above a water-fall, over three very primitive constructions which served for bridges. The bed of the river at this spot has an elevation of 7,790 feet, and we found the temperature of the water to be  $42^{\circ}$ , too cold for bathing. After a very steep and fatiguing ascent of four or five miles, we reached our halting-place at Chockachaine at  $\frac{1}{4}$  before 2 P. M. There is a pool of indifferent water here, and a hut erected by the yàk herdsmen who often reside here during winter. The height of the encampment, as ascertained by boiling water, was 10,300 feet. The hill sides were perfectly covered with forest trees and tangled underwood, the same as yesterday. As we ascended, the changes in the flora were very remarkable. We were now in the region of rhododendrons, of which we observed several kinds ; also of oaks, whose acorns were scattered along our path in great profusion, holly ; walnut, chesnut, long and short-leaved scarlet barberry ; many beautiful varieties of ferns ; mosses pendent from trees, besides other kinds, including the stag moss so well known at Darjeeling ; creepers of all kinds and sizes, epiphytical and parasitical plants of various kinds ; and towards the end of our day's journey we were well amongst tall firs. We saw a few leeches, but found the ticks most abundant and voracious.

Thermometer at sunrise  $28^{\circ}$ , but not so cold to the feeling. We ascertained that all the yàks had left Jongli and were in the vicinity of Chockachaine. We sent a man to drive the yàks to our camp for inspection, but we quitted before his return. Left at 8 o'clock and after a steep ascent reached Mon Lepcha at 11.15 A. M. and Jongli at 1 P. M. From Mon Lepcha the road is easy, but we found the first part of the road very trying, all of us suffering more or less from shortness of breath and headache. There are no huts at Mon Lepcha : it is the name given to the locality, which is a feeding ground for yaks at an elevation of about 14,000 feet. Dr. Simpson took some photographic views of the snow which is very imposing from the spot. Between this and Jongli we passed several frozen rivulets.



Jongli is the name given to an extensive tract of yàk pasture land, situated at the foot of Gubroo, on the southernmost spur of that mountain, including all the land to the south of Gubroo, contained between the Ratong and Chuckchurong rivers, of which Mon Lepcha is an integral part. The elevation of the pasture land averages from 12,000 to 16,000 feet, the latter being the greatest height at which yàks are grazed during the summer months. The spur is broad and undulating like a swelling table-land devoid of forest. It is richly covered with good grass, intermixed with a low and scrubby rhododendron and the dwarf and an aromatic kind. It is the grazing ground of about eighty yàks belonging to parties in Nepal and Sikkim, and is capable of affording pasturage to many hundreds more. The yàk herdsmen have erected three substantial huts of stone with shingle roofs. They reside at Jongli during the summer and rains, but when the cold sets in in November, they descend to winter quarters in lower and warmer elevations. The entire pasture ground is well watered by numerous perennial streams, most of which were frozen up at night during our stay at Jongli. It is situated above the region of tree rhododendrons and firs. During our ascent we passed through all the flora met with at Sinchul and Tonglo. At 12,000 feet we lost the ferns. Having passed through firs, birch, rhododendrons, junipers and a kind of heather, dwarf and aromatic rhododendrons, barberry, primrose, &c., we entered the undulating and grassy flats of Jongli. On the road, not far from our last halting place, we met a wild looking man of the woods, whom our servants introduced to us as the Llama of Jongli. He stated himself to be eighty years of age. He looked more like a Gorilla than a human being. A more comical weather-beaten and hale old gentleman I have never seen. He had a very hoarse voice and a large goitre to boot. He had just left Jongli for his winter quarters, which he had taken up under an over-hanging piece of gneiss rock in a fir forest.

After tiffin at 2.30 p. m., MacPherson and I set off for the summit of what we considered to be the highest of the Jongli mountains. After two hours of very fatiguing climbing and suffering from shortness of breath, headache and nausea, we reached the top and found it to be 15,120 feet.\* Thick clouds setting in, we were disap-

\* This hill affords capital pasture for the yàks, being covered with good grass and juniper bushes. The latter all assume the same inclination as the slope

pointed in the principal object of our trip, which was to endeavour to trace a practicable route by which to reach the snow peaks in that direction. The surrounding hills were totally obscured, and in commencing our descent, the guide wanted to take us down the wrong side of the hill; but preferring to trust to our compass we were not misled.

With splitting headache and quite knocked up, we reached our hut at 5 P. M.

The night was very cold, but being well provided with warm clothing, we were all right; but the coolies, although well-housed, suffered a good deal.

The thermometer at sunrise stood at  $18^{\circ}$ . The small streams were all frozen. At this early hour the snow appeared so close that it seemed to tower above us. The sky was cloudless and the cold very keen. After breakfast we went on a reconnoitring expedition to the summit of Thonja, a hill immediately to our front, at the foot of Gubroo, in the direction of Kanchunjingah. It is a fine grassy mountain affording excellent pasturage, about 14,500 feet high. Dr. Simpson took some beautiful photographs of this wild region.

When on the crest of the hill, which is precipitous to the north side, we witnessed a very beautiful and perfect sun bow. It was seen in a mist a few feet down the precipice and remained visible for a long time. We reached our hut at 2 P. M., some of us feeling very queer from the rarified state of the atmosphere, having headache and nausea. On our return we flushed two covies of birds at from 12,000 to 13,000 feet, closely resembling Ptarmigan, probably the "*Tetragallus Himalayensis*" of which I have since seen some specimens in the Society's Museum. I shot one with a bullet which immediately concealed itself under the rocks, and occupied us a long time getting it out. In the evening the men who had been sent down in the morning to bring up the yak purchased from the Doobdee Llama returned, bringing a fine black animal with an uncommonly bushy tail, about the size of a Highland bull.

The morning was very fine, but the night had been intensely cold. Shortly after sunrise the thermometer stood at  $17^{\circ}$ . The first object

of the hill side caused apparently by the strong blasts of wind which constantly blow up the hill.



that attracted my attention was our black friend the yàk, who had turned white during the night, his long shaggy flanks being entirely covered with a coating of ice.

After taking an early cup of cocoa, some of the party started on another exploring expedition.

After proceeding about three miles, sometimes along yak tracks, and at others along the grassy slopes of the mountains and over dwarf rhododendron, we found ourselves on the verge of a deep precipice which entirely cut us off from a snow spur which we desired to reach on the other side of the gorge. It would have taken us hours to reach the bottom of this valley and the remainder of the day to ascend the opposite side; so we relinquished the object we had in view at starting, and decided upon ascending the perpetual snow clad peak of Gubroo instead. After partaking of breakfast near the Gubroo lake, a fine clear and deep sheet of water 130 paces square, situated in a picturesque spot at the foot of the mountain to the south-east, we commenced the ascent of Gubroo which we found very trying from its steepness, and the great elevation causing shortness of breath, nausea, and violent headache. We reached about 16,500 feet, when I found it impossible to proceed any further, in consequence of an oppression in the head and a feeling like that of seasickness. The Gubroo range, as seen from Darjeeling, presents a black, rocky and precipitous foreground to Kanchunjingah. It is formed of a finely laminated dark colored gneiss and hornblende, which exist in immense angular masses, rising in steps with perpendicular walls. The snow lies very thick on the summit of these flat masses and in the cavities, though scarcely visible at a distance.

The snow was very bright and dazzling; our attendants being unable to stand the glare and cold, remained behind. We commenced the descent at 1 P. M., and reached camp at 3.30 P. M. The droppings of deer were everywhere visible, but we only sighted one musk deer which rose close to us in scrubby rhododendron forest. A fine covey of *Tetragallus* and two solitary snipes were also seen, but we were disappointed at the absence of game along the eastern slopes of the Jongli plateau which is well watered by numerous small streams, some of which spreading out with marshes and small lakes afford excellent cover for pheasants and jungle fowl. During our absence our headman had shot the yàk and prepared a savoury

stew of yàk's heart and kidneys which we diseussed with a hunter's keen appetite.

Another superb morning: the night was intensely eold, and the thermometer a little after sunrise stood at  $11\frac{1}{2}^{\circ}$ . Having made all the neecessary arrangements for an absenee of four days, and leaving all heavy baggage behind, at 10.30 A. M. we started for a plaee situated near the base of the Pundeem mountain, on the left bank of the Ratong river, several miles further up the valley, ealled Aluhtong, where there is a yàk-grazing post. After proceeding about three miles along yàk traeks over grass and low rhododendrons, we eommeneed a steep deseent through rhododendron forest, and afterwards through firs, and reached the banks of the Ratong about noon. The river here is broad and rapid, but as we aseended the valley, it became less rapid and of smaller dimensions. It was not without difficulty that we found our way along the broad valley, over masses of loose stone and broken ground, by following the course indieated by small piles of stones erected by the yak herdsmen. We inereased the number and size of these useful guides for the benefit of our friends in the rear, and after two or three times losing our way, reached our destination at 2.30 P. M., and some of the party an hour later; and the baggage coolies late in the evening, looking half frozen. We brought on a tent for the latter; and before turning into our own hovel, we satisfied ourselves that these were well supplied with fuel, yàk's flesh, and rice for their evening's repast. The grandeur of the surrounding snow-elad mountains, and the wildness of the scenery of the valley of the Ratong, surpasses any thing of the kind I have elsewhere witnessed in the Himalayas. On looking directly north up the valley, Kanehunjingah rose majestieally above everything else. Between us and it, thrown completely across the valley, and only two miles distant, was seen a stupendous morain a thousand feet in height, which forms the eonspieuous objeet seen from Darjeeling. Immediately on our right, out of a long range of perpetually snow-elad mountains running parallel with the valley, rose the formidable peak of Pundeem, 22,015 feet in height, at the base of which rests the glaeier above alluded to, and many other masses of debris washed down from above in wild eonfusion. To our rear, winding its eourse down the broad valley, the hills on either side being covered with dense fir forest often down to



the water's edge, was seen the noisy, foaming Ratong. On our left a dark range of bare, bold and craggy mountains 16,000 or 17,000 feet high, capped with snow, having the appearance of basaltic formation, but formed of gneiss mixed with hornblende and syenite, rose abruptly. We were the first European travellers to gaze upon this truly grand scene. Any one desirous of witnessing grandeur of scenery should visit Alutong. However toilsome and comparatively uninteresting he may find the intermediate travelling as far as Jongli, he will be well repaid by the wild scenery of this locality.

Another cold night, and clear, crisp morning; thermometer at sunrise  $5\frac{1}{2}^{\circ}$ ; and at sunset, the valley having been in the shade since 4 P. M., it stood at  $21^{\circ}$ . At 10 o'clock we all started to explore the morains. We proceeded at times along the bed and banks of the river, at others over rough, stony ground, deeply intersected by small running streams coming from the snow. The main stream flows gently over a gravel bed of moderate incline. The valley is nearly a mile broad, and covered with dwarf rhododendron and grass wherever soil occurs.

A little before reaching the morain we passed a series of Mendongs, having numerous slabs of well carved prayers and images of the gods in the side walls, extending the entire length. These slabs of chlorite slate are carved by Llamas from the Sikkim monasteries who periodically visit this place on pilgrimage during the rains.

Having ascended the immense mass of debris forming the morain, probably to an elevation of 15,000 feet, we found ourselves, to our great surprise, standing on the top of a stupendous glacier. This huge mass of ice and debris descending from the Pundeem mountain extends nearly across the valley, where it is met by, and abuts upon another glacier, equally vast in its dimensions, and formed at the base of the snow-clad mountains on the other, or western side of the valley, the two together forming a complete barrier across the valley and choking it up to the height of a thousand feet or more. The morain forms the retaining wall to this mass of moving ice and debris, and is composed of rounded and angular blocks of *highly contorted gneiss*, intermixed with pieces of syenite, micaceous schist, coarse granite, quartz with tourmaline crystals, white and pink quartz, often containing veins of crystalized felspar and coarse gravel and debris. Towards the summit the fragments were all

angular, and free from gravel. The loose manner in which these were massed together, rendered walking both difficult and dangerous, particularly to parties in the rear, from the tendency of the stones to roll down the steep sides. Proceeding onwards, the glacier presented a perfect wilderness of blocks of ice invariably covered with the stones and debris brought down from the mountain above by avalanches, with deep crevasses through which the sound of running water was heard, the whole presenting a stony and undulating mass about one and a half miles long and a half to one quarter of a mile broad. In order to ascertain as nearly as possible what might be the thickness of the glacier, we ascended by a separate spur of Pundeem to a level with the top of the glacier, and measuring the height by boiling water found it to be 16,060 feet, and again measuring the height at the foot found it 13,760 feet, thus giving a difference between the summit and the base of 2,300 feet. I was able to make a rapid sketch of a vertical section of a precipice on the western shoulder of Pundeem, shewing its formation to be of gneiss, similar to that found on the glacier of which I brought away some good specimens. Although the surrounding hills were literally covered with glaciers of sizes, and the valleys overhung with masses of ice and snow, we observed only one avalanche, but frequent loud cracking of the ice during the hottest part of the day.

A little way up the valley, beyond where the glaciers meet, we observed a small lake. Only one small stream falls into it, and this must be considered the source of the Ratong during the winter months. Dr. Simpson here took some interesting photographic views. We returned to our hut late in the evening. To-day our Lepcha cook whom we brought from Darjeeling failing to give satisfaction was removed from office. Thus the cooking operations devolved upon ourselves; but this was not felt to be irksome, as we had from the beginning taken turn about to look after the messing for the day, knead the flour for making chupattees, or unleavened cakes, assist in cooking, &c., our *ci-devant* cook knowing nothing of the mysteries of his profession beyond lighting a fire, boiling water, washing plates and so forth. In fact he was an impostor.

Another cloudless morning after an intensely cold night. Thermometer at sunrise 11°. The coolies having laid in a good store of wood over night, next day we were enabled to cook an early breakfast



and resume our explorations in the direction of Kanchunjingah. Mounting over the two glaciers of yesterday, and proceeding by the lake, which we found to be about 500 yards long by 100 broad, we ascended another immense morain which confined a third glacier on the west side of the valley. This one appeared to begin nearly on a level with the top of the mountain range, at probably 20,000 feet, then descending by the mountain side came sweeping along the valley in a curve about a mile in length, the more elevated portion being formed of masses of ice covered with snow, rising in steppes one above the other, and the lower portion presenting a sea of broken masses of ice, covered with snow and debris. A more stupendous mass of ice and snow it is scarcely possible to conceive. Dr. S. took a photograph of it. On our right at the foot of Pundeem we saw another lake partially frozen, and a little further on a third one. Descending from the glacier we proceeded for a mile, occasionally along the dry, smooth bed of the Ratong, and over frozen snow, when we arrived at the fourth and last glacier, equal in extent to the others. With great difficulty we scrambled up the steep sides of its retaining morain, over frozen snow. When near to top, Kemble was nearly precipitated to the bottom by his foot giving way and only saved by rapidly digging his alpine stick into the snow, which pulled him up.

On reaching the northern extremity of this glacier, at the head of the Ratong valley, we found ourselves standing on the water shed between Kanchunjingah, and the Pundeem, Kubra, and Junnoo ranges to the south and west. We were at an elevation of about 18,500 feet, and had we proceeded further, we should have had to descend into what appeared to us a perpetually snow covered valley. Although we were unable to look down into the bottom of the valley, we could see the clouds rise out of it from the east and west and ascend the sides of Kanchunjingah, of which we obtained a near and good view through a narrow gorge which terminates the Ratong valley. Kanchunjingah stood apart, unconnected with any of the high mountain ranges to the south. The nearest spot not covered with snow in its southernmost spur was probably not more than a mile and a half or two miles distant, the stratification of which was clearly visible. Its formation is probably of gneiss, not of a contorted type, and which has a dip of 20 to 25° to the east. Others may determine the interesting point of its geological structure, but this

important fact was elicited, namely, that Kanchunjingah is detached from the other mountains forming the Kanchunjingah group, and that none of its waters find their way into the Great Rungeet, either by the Ratong or any other tributary.

Our half frozen coolies, unable to proceed so far over the snow, dropped to the rear unobserved by us, but we picked them up on our return, and Dr. S. managed to get three good photographs, one of which was "*Pundeem from the north.*" It being too late in the day to attempt any further exploration, we commenced our return at 2 P. M., and after several stoppages and very brisk walking we reached Aluhtong by moonlight, at about 6.45 P. M., having undergone a very laborious and fatiguing day's work, during nine and a half hours. We found a Bhooteah lad had prepared us some yàk soup and chupattees which we fell upon with ravenous appetites.

We all rose with heated and sore eyes, and scorched faces, the effects of the cold wind, the sun and the glare from off the snow. Thermometer at sunrise 11°. At 9.30 A. M. we quitted our hut and very reluctantly turned our backs upon the wild scenery of the upper Ratong and our faces homewards. Arrived at Jongli at 2.30, but not so our coolies, who had suffered so much from the cold at night, and from the cold blasts of wind during the day, which incessantly blew up the valley during our stay at Aluhtong. We retraced our steps, guided by the heaps of stones, and after going about four miles commenced to ascend by the steep pathway through the firs and rhododendrons. The road was rendered very difficult and slippery by the recent fall of dead leaves. Passing under Gubroo, and near the lake, we reached our old quarters at Jongli at 2.30 P. M., and the coolies two hours later.

Rose early, packed up for a start homewards. Left our homestead at Jongli at 8.30 A. M. with twenty-four coolies, four of whom carried guns, four bedding, two minerals, two photographic apparatus, one the tent, ten stores, cooking utensils, &c., and two were sick. The coolies were badly clothed, some had sore legs and chapped hands and feet, and all looked more than half frozen and incapable of carrying loads at this early hour of the morning, but not a murmur escaped them; they left with heavy loads, but light hearts, our cook boy remaining a few minutes behind to blow a parting blast upon a horn or Llama's thigh bone, or some such harmonious instrument. We had



seen Jongli to disadvantage clothed in its autumnal garb, and totally deserted, being too cold and bleak at this season of the year for a residence ; but in the spring and summer months it is no doubt a bright and cheerful spot. During our descent through the firs, we saw our Gorilla Llama engaged in cutting timber near his winter dwelling, and we turned aside to salute him. The largest fir met with by the road side measured 21 feet in girth, and may have been 80 or 90 feet high. Reached Chuckachaine at 1 P. M. and found a small herd of twelve yàk bulls, cows and calves, on the feeding ground at this place. Their colours were black, black and white, and slate coloured. We purchased yàk milk, and drank it mixed with brandy. After half an hour's rest we resumed our march, and descending very rapidly, re-crossed the foaming Ratong by the three crazy bridges, and arrived at Jongoo 2.30 P. M., a distance of about fifteen miles. During the short interval since our upward passage the dead leaves of the rhododendrons and other forest trees had fallen in such abundance as to render the steep descent very slippery and difficult. Having descended nearly 5000 feet, we found the change in the atmosphere most agreeable. and the ticks as numerous and loathsome as before. Mon Lepcha spur is composed of fine gneiss, intermixed with beautiful white quartz and mica schist. From Mon Lepcha I made a series of magnetic observations to fixed points, which enabled me to fix its exact position.

Left Jongoo at 8.30 A. M. and after an hour's brisk walk crossed the Barabarong by a very frail bridge formed by throwing a sapling across the main stream between two large boulders. The bed is full of large angular blocks of gneiss, the same as exists in situ. When within a mile of Eksum, we met Mr. Long and Lieut. Bartley, of the Queen's Bays, proceeding to Jongli on a similar visit. They were scarcely prepared for the extreme cold they were about to encounter. We assisted them with some spare rice and clothing. We have since heard that they experienced very severe weather and were compelled to return. Reached Eksum at noon and proceeded to the house of our former host, who at our request made us baked cakes of the flour of millet seed and buck wheat mixed. The flour is quite white, but harsh to the touch. The cake is baked on a heated slab of stone, and when cooked becomes quite black, but is not disagreeable to the taste. It must, however, become very unsavoury when eaten as the sole

article of food, as is the practice with the hospitable inhabitants of this wild and sequestered spot. After purchasing fowls, murwa, eggs and milk, and presenting the members of the family with some articles of warm clothing, we resumed our journey at 2.30 P. M., much against the wishes of our coolies, some of whose families reside here, and all of whom wanted to remain for the night. After a long descent along the Eksum stream, at 3.30 P. M. we passed the Parmarong stream a little below the water-falls, where some of the party had a refreshing bathe in its crystal-like waters amidst blocks of beautifully stratified gneiss. Continuing our course without either much ascent or descent, at 4.30 P. M. we reached Ribbing or Bootong, a small clearance consisting of one Limboo and one Lepcha family, the members of which appeared very poor and destitute of clothing. We put up in the hut of the former, and our Bhooteea cook boy professed not to understand a word of their language, and made signs for any thing he required.

Thermometer at 7 A. M. 50 . Left Ribbing at 9.30, and after a steep and rugged descent reached the Ratong and crossed by an old bridge constructed of bamboos and trees, which had just been repaired for our use ; about a mile further on, we crossed the Ringbi by a very dilapidated suspension bridge made of bamboos. The jungle creepers forming the suspenders of the roadway were all rotten, and the whole fabric bore the appearance of great insecurity. The scenery here and also at the Ratong is very wild and picturesque, and it was matter of regret that "our artist" was not prepared for taking photographs. Observed mica schist in large quantities in situ, and in the beds of both the rivers. From the Ringbi we made a steep ascent to Chongpoong, passing through tree forest and ferns. Our Chongpoong friends did not come out to meet us on this occasion, so we sent to the headman, and purchased some murwa, fowls and eggs, and after an hour's rest started again at 1 P. M., and passing through the umbrageous tree forest below Pemionchee, we reached the Goompa at 2.10 P. M.

The Llamas were not so civil as on our first visit, and on this occasion the head Llama did not make his appearance. On being questioned as to our despatches and stores, they informed us that none had arrived from Darjeeling. This we knew to be false. On closely questioning one of them, he indicated the place where I could find



them. Dr. S. had inadvertently left behind a portion of his photographic apparatus, this had been picked up by one of the monks who declined to restore it, unless he received a remuneration of 2 Rs. Under the circumstances this demand was refused, and the man of holy orders peremptorily ordered to give it up, which he did, and never shewed his face again. This avariciousness was probably caused by seeing us pay liberally for every thing we required, a policy we strictly adopted from the commencement, and which secured us a ready and ample supply of every thing. The prices paid were—rice 12 seers per rupee, fowls 8 annas each, milk 4 annas per bottle, eggs 2 for an anna.

Pemionchee is about 7000 feet high. The thermometer at sunrise stood at 45°. The weather was close and cloudy. Left at 9.30 A. M. and after a very rapid descent passed Gazing at 10.15, stopping a short time to photograph "the Great Mendong" at that place. Reached the Kullait river at noon. After a long, rapid and fatiguing descent, we found the villagers and fishermen had erected a substantial bridge of bamboos about a mile below the weir since our former visit. Here we enjoyed a refreshing bathe in the clear cold waters of the Kullait, and washed clothes, and at 1 P. M. continued our journey up the northern spur of the Rinchingpoong hill, which has a much milder gradient than we had been accustomed to for some time past. At 2.15. halted for a quarter of an hour for luncheon at Soomtong, and reached Rinchingpoong at 4 P. M.; but the coolies did not arrive until after dark, the march being fifteen or sixteen miles, and very fatiguing—the descent from Pemionchee to the Kullait being not less than 5,000 feet, and the ascent to Rinchingpoong about 3,600 feet. We put up in the Llama's house on the ridge of the hill, situated in the midst of barley cultivation. The dwelling consists of one spacious room, in which was a miscellaneous family of men, women, maidens and children, none of whom were at all put out by our presence, but sat round a large fire drinking tea, &c. Some sugar given to a man was handed round the family circle for each to taste, and some hot brandy and water given to another man in the palm of his hand was in like manner handed round to each member to take a sip, after they had retired to rest. The hill tribes are particularly liberal and friendly towards each other, always sharing with their friends anything they may become possessed of.

Simpson and Maepheron left long before daybreak with the intention of walking into Darjeeling, a distance of about thirty-six miles, which they duly accomplished, stopping only to bathe in the Rummàn.

My host the Llama was very early engaged in his matutinal devotions, but stopped short in the midst of his prayers and ringing of bells to drink a cup of cocoa, which he seemed to relish with great gusto. A young mother, with an infant at the breast and a deficiency of milk, came in the morning to the Llama, who by a prolonged blowing of short puffs of breath on the naked breasts, was supposed to have administered an effectual remedy. Such is the deception practised on the minds of these simple people by their spiritual guides.

Kemble and I, not being in a hurry, left Rinchingpoong at 8.30 A. M., crossed the Rishee at 10 A. M., and the Rishee cultivation where our first camp was at 10.45 A. M., and at 2 P. M. put up in a hut by the road side near a very small stream about 1000 feet above the Ruttoo. At Rishee we observed a very large flock of Hornbills.

23rd November, 1861.—Left our hut at 7 A. M. and reached the Rummàn at 9.30, crossing by a good substantial bridge just completed by the sappers. Reached Goke Guard house at 10.30, halted 15 minutes. Reached Little Rungeet river at noon, where we found our ponies in waiting. Reached Darjeeling at 2.30 P. M. Observed many clearances being made for the cultivation of tea along Tugoor spur, &c.


The coolies who accompanied us consisted of two Lepchas, two Limboos and twenty-one Sikkim Bhootees, almost all of whom, as well as their Sirdar named Tinley, were inhabitants of that portion of Sikkim to the west of the Great Rungeet traversed by us. No men could behave better than they did, the words “burra dikh” and “tukleef,” so common in the mouths of Hindustanis and Bengalis never escaped theirs, neither did complaints of any kind. Even in sickness, or when suffering from extreme cold, or sore legs, or chapped hands and feet, there was no grumbling. They were always ready to perform their work with a cheerfulness and light-heartedness quite refreshing to witness, after being accustomed to deal with the unmanly and discontented inhabitants of the plains, particularly of Bengal. They all readily and gladly partook of any remnants of food we were able to spare them, as did all the villagers in whose houses we put up.



In the valleys, where Lepidoptera exist in countless myriads during the rains, very few were seen by us, and no Coleoptera at all. *Pyrameis Callirhoe* was common at great elevations. I observed it on the snow, and on the glaciers at 13,000 to 16,000 feet, but it was *the sole inhabitant* of these cold and dreary regions. It is difficult to understand how an insect so delicately formed as a butterfly, could exist at an elevation where the thermometer must have stood at zero at night time. We saw a few small birds resembling larks at Aluh-tong, and an occasional eagle, but the absence of all wild animals and game was remarkable. None of the lakes or pools of water, as far as we could ascertain, contained any fish, or any living creature.

From the time we left Darjeeling to the date of our return, a period of twenty-two days, we experienced delightful weather. When in the vicinity of Jongli, the clouds would generally ascend the valleys from the plains between 2 or 3 in the afternoon and obscure the snow peaks for a time, but after an hour or two they would disappear and leave us to enjoy cloudless evenings and nights, and the rare, but truly magnificent spectacle presented by the moonlit snowy masses around us. The great enjoyment and advantages of fine weather, the absence of leeches, pipsas, sand-flies, mosquitoes and other such like torments experienced by former Sikkim Himalayan travellers, also the absence of extreme heat, deadly miasma in the valleys, and fear of contracting jungli fever, all point to *November* as the most desirable month of the year for travelling in these still unexplored regions. The third day after our return, the weather suddenly became raw and cold. At Darjeeling we had rain and hail, and the military stations of Jellapahar and Sinchul were covered with hail and snow. At the latter place the fall was  $3\frac{1}{2}$  inches thick, and remained for several days on the ground.

*Camp ; March, 1862.*



*Notes of a trip from Simla to the Spiti Valley and Chomoriri (Tshomoriri) Lake during the months of July, August and September, 1861.—By W. THEOBALD, Esq., Jnr.,*

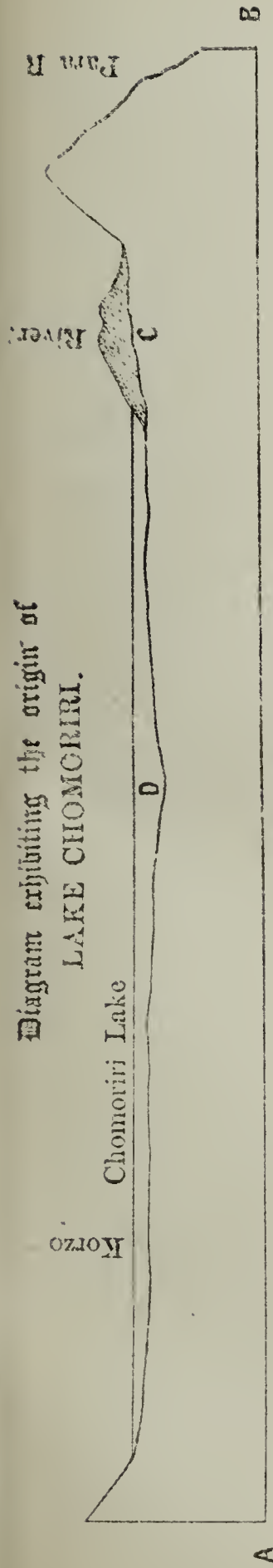
The object for which the present trip was undertaken, was to acquire some definite information regarding the interesting fossiliferous deposits, both of Palæozoic and Mesozoic age, known to exist in the Spiti valley and the higher Himalayas, to ascertain as far as a cursory examination would permit, their extent, and relations to the older groups in contact with them, and to collect such a series of fossils from them, as should facilitate the determination of their age in the geological scale, and thereby afford a key for the approximate determination of the age of those older groups, in which fossils are either rare or altogether wanting. These objects have, I trust, been to some extent accomplished, though I shall not now touch on geological questions, which, with the result of the examination of the fossil collections, will appear elsewhere at some future period. In the meanwhile I have put together a few notes of a general character, in hopes that they may prove of some interest or service to any one about to travel over the same ground.

I may, in the present place, perhaps be expected to allude to two papers by Capt. Thomas Hutton, entitled “Journal of a Trip through Kunawar, Hungrung and Spiti, in Vols. VIII, and IX, of the Asiatic Society’s Journal for 1839 and 1840,” and a “Geological Report on the valley of the Spiti and of the route from Kotghur, in Vol. X, of 1841.”

Of the first of these, I have little to remark; but, as regards the second, I must deny the applicability of the term *geological* to such speculations as it presents. Capt. Hutton has, in fact, fallen into the not uncommon error of confounding cosmogony with geology, although they have no more in common than the alchemy of the Middle Ages possesses with the science of modern chemistry. To attempt the serious refutation of some of the views of Capt. Hutton, on subjects connected with geology, would be almost as hopeless, not to say absurd, as for a surgeon to discuss the treatment of Aneurism with a man who denied the circulation of the blood; and I must, therefore, excuse myself from entering at any length on the merits of the views of cosmogony and creation set forth in the above paper: but they are, I fully believe, as ingenious as

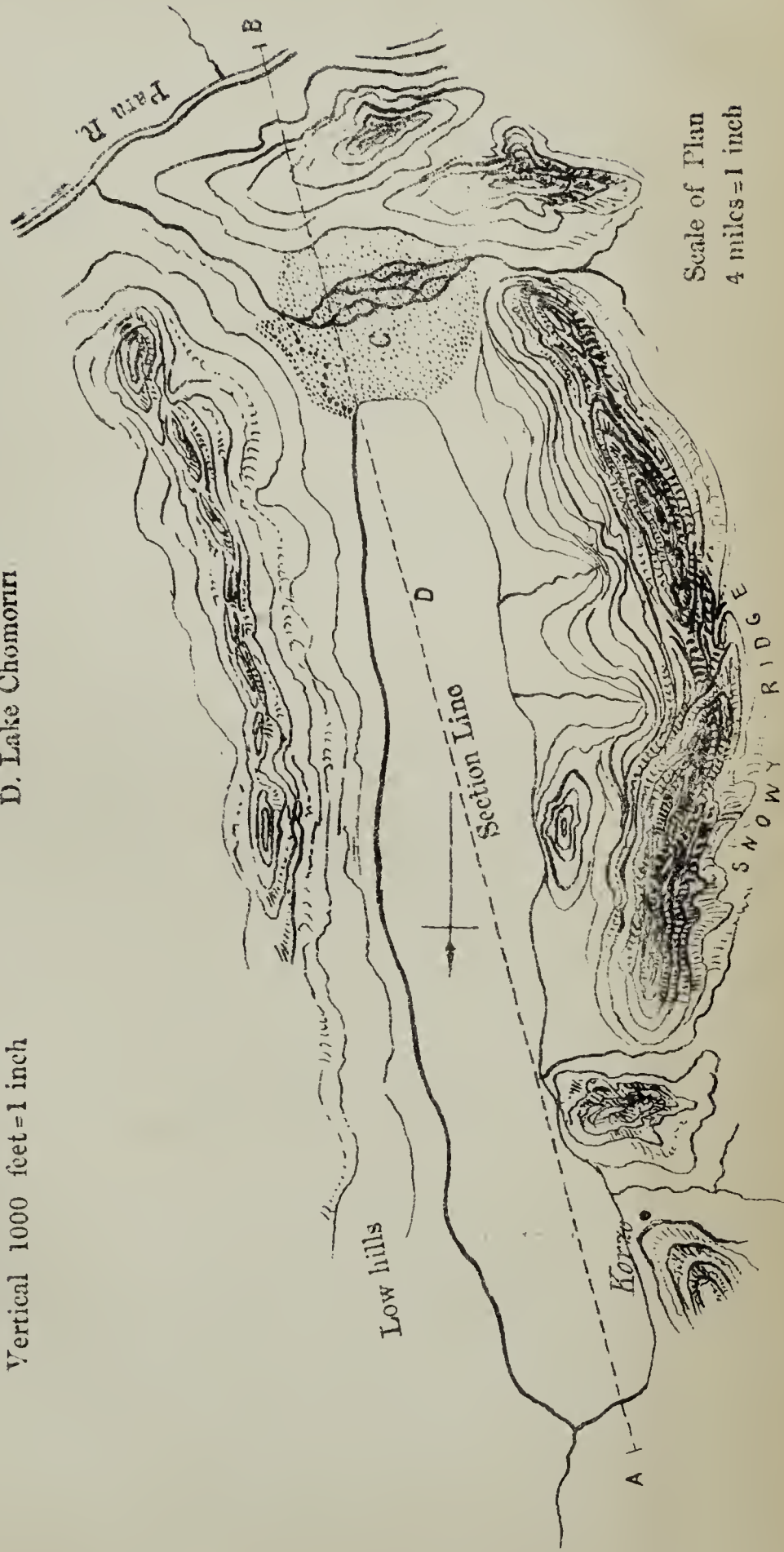


# Diagram exhibiting the origin of LAKE CHOMORIRI.



- A. B. Line of Section.
- C. Shingle accumulated by an affluent  
to the Chomoriri Valley.
- D. Lake Chomoriri

Scale of Section.  
Horizontal 4 miles = 1 inch  
Vertical 1000 feet = 1 inch



Scale of Plan  
4 miles = 1 inch





such speculations usually are, and, by originality and bold disregard of the most obvious conclusions of geology, deserve honorable mention among the choicest of those similar schemes, which the late Hugh Miller has rescued from oblivion, and embalmed in his witty and laughable chapter on the geology of the Anti-geologists.

When starting myself on this trip, I greatly felt the want of a few hints regarding the equipment requisite; such as the best form of tents, the amount and sort of stores, and the number of servants necessary, &c. I shall, therefore, offer a few preliminary remarks on such subjects, many of which must appear very trivial to any one unacquainted with the vicissitudes of Himalayan travelling, but which may be better appreciated by the traveller on the eve of undertaking a similar journey.

It need hardly be stated, that coolies are the most convenient kind of carriage for the Himalayas; though in many parts, ponies, mules, or yaks may be substituted; as a rule, however, all baggage should be so adjusted, as to be capable of being carried by a single man, as though along made roads heavier loads, requiring two or more men, may be found convenient, such loads are very unsuitable, and occasionally utterly impracticable, along the difficult paths, which will inevitably be met with during a prolonged journey in the hills. Regarding coolies, there is scarcely any serious difficulty in procuring as many as may be required in moderation, though the plan which I adopted, and it is one possessing certain advantages, was to engage in Simla, for the entire trip, half the number of coolies I required; this plan involves a little extra expense in many ways, and is strictly speaking unnecessary, but from experience I should recommend its adoption by others, and should certainly follow the same plan myself on any future occasion.

The daily rate of wages for a cooly throughout Bissahir and Kunawar is four annas, and in the British district of Spiti two, though the shorter stages often met with in Spiti causes the price of carriage in reality to assimilate nearer than might be supposed. I have often heard the higher rate of wages in Bissahir complained of as exorbitant, and our Political blamed for not causing a reduction to be made; but very unreasonably so, I think. It is frequently urged that, as the majority of men in the hills who carry a traveller's baggage from day to day, are employed in and gain their livelihood by

agricultural pursuits, half of the present rate would be an adequate and acceptable remuneration to the men, whilst at the same time a great pecuniary relief to the traveller. Parties who argue thus, would probably esteem it a more thorough sort of relief, to at once resort to the old "begaree" system of gratuitous or forced labour, once recognised and prevalent in the hills when European travellers were rarer than at present; and as no one class of the population could gain a living by this inoppressive system (to the pockets of the traveller), the entire population, who in turns would have to surrender their services, would be led to entertain an appropriate sense of respect for their vagabond lords and of the manifold benefits conferred by their presence. The time has, however, arrived for native customs of this description to give place, and for us to regulate our conduct towards natives of this country by rules consonant with European rather than Asiatic ideas. Endeavouring, therefore, to estimate the amount of what may be considered a fair day's pay for a fair day's work, I confess that four annas does not appear to me an extravagant charge; that is, for an average march of fourteen miles, often along extremely bad and difficult roads, over which the cooly has generally to return empty-handed.

A far juster ground of complaint than the rate of cooly hire or wages, is the capricious rate at which flour is sold to the traveller, and as a matter of justice, I was forced to make up the difference to my servants, when the price rose above nine seers for the rupee, as otherwise their wages would have barely sufficed, in some places, to provide them with flour alone, since in some villages of Kunawar I got no more than five seers for the rupee. This I believe to have been an imposition, though it must be remembered, that wheaten flour is not the staple of the district in these places, but is imported for the use of travellers. At Korzo, at the western extremity of lake Chomoriri, I got four and a half seers, and was told that it was no more than twelve seers per rupee at Lè or Ladak. One circumstance which proves that this was not an altogether fictitious price, put on for the purpose of profit, was that, though paying this high price, I was unable to get as much as I required, and was forced to take rice and sheep to feed my people, as well as flour.

By order of the Maharajah, I believe all officers attached to the Grand Trigonometrical Survey, in his territory, are supplied at the rate



of forty seers of flour for the rupee, but this is I consider a manifest oppression, though many English gentlemen are not ashamed to avail themselves of a despotic order to live cheaply. When I visited Kashmir in 1853, I sometimes had to contest with the native officials about supplies, coolies, &c., but they generally concluded their own demands by observing that *I* was their Hakim, and that the Maharajah would slit their noses if I had any cause of complaint. In like manner the headman of Korzo frankly declared, that if I chose to take provisions by force I could do so, at my own rates, but that he could not sell to me freely at a lower rate than one rupee for four and a half seers. Other travellers I know got their flour here at one-third of this rate, but I consider it neither just, dignified or politic, for English gentlemen to travel through native states dictating their own rates, and brow-beating the authorities in virtue of their being Englishmen. On referring moreover to Cunningham's Ladak, I see he states sixteen seers as the price of flour at Lè in 1847, so that twelve seers is not probably a greater advance in price than would naturally take place in such a famine year as 1861, and not to be compared with the rise in price in Hindustan. The staple supplies of flour, ghec, salt and mutton are nearly every where procurable, but all other articles of consumption, as sugar, tea, spices, rice, onions, &c., must be taken from Simla in sufficient quantities for the trip, being rarely procurable elsewhere. The following articles will also be found very useful, either in case of actual short commons, or by way of change from the everlasting mutton and chupatties, viz., preserved soup and vegetables, spiced beef and sausages in 1 lb. tins, sardines, plain biscuits, a small cheese, and some pigs' cheeks or pieces of bacon of about 6 lbs. each, which last keeps well and will always be found useful.

Wine or spirits, though not requisite at low elevations, are greatly needed in the higher ranges and plains of Ladak, and it is a real hardship to run short of them in tents, when the thermometer is at or near 30°. For a three months' trip, however, not more than seventeen to eighteen coolies are requisite. I took but thirteen, one of them taking a servant's tent, which is not requisite in Kulu or Bis-sahir, but is absolutely necessary in the colder parts of northern Kanawar and Ladak.

A comfortable sleeping pâl which can be carried by one man, (another taking the poles,) will be found most convenient, with a

proper supply of iron pegs, in case of the ground being stony or frozen:—the ordinary blanket tent used by some, lined with wax cloth, being in my opinion inconveniently small, especially if two or more constitute a party. At the same time in no case should the tent be too big for one man to carry.

As regards servants, it is by no means easy to dispense entirely with Hindustanis, though the majority of them are badly suited for hill travelling. Musalmans are far preferable to Hindus, as from the nature of their food they are more capable of enduring the rigour of the climate at a high altitude. One or two men should, however, be added to the party who are familiar with the language of the parts to be traversed, and I found nothing so inconvenient as the want of a man who could hold converse with the people of Spiti and Ladak, which none of my men could do properly.

Another very necessary thing is to be provided with an ample supply of good *English* walking boots, and thick woollen stockings. I found the coarse native stockings, which can be got in Simla, three pairs for a rupee, answer very well, though the European article is of course preferable. I have seen much inconvenience caused from want of proper boots, which wear out with unexpected rapidity in the hills, especially during wet weather, and if the same boots are continued in wear when wet. I have seen it recommended in some work, in case of a new boot proving tight, to break an egg into it *before* putting it on, but a preferable plan I have found to be filling the boot with warm water after it is put on. The surest plan, however, to secure comfort in walking and avoid troublesome blisters on the feet, is to have boots made large enough to admit of two pair of thick woollen stockings being worn with them. The relief this plan affords is wonderful.

Powder and shot are articles which of course must be taken as well as lead, and small quantities of either form very acceptable presents to village headmen and others for any trifling services. The summer time is, however, not the best for sport, as below the forest line the jungle is too thick to enable one to see any distance, and in the higher hills the game is distributed over a large area, which in winter is inaccessible to them and circumscribed by snow.

Throughout Bissahir and Spiti, the people seemed to have little taste for shooting, though numbers of Burrel and Ibex are slaughtered



every year in winter time, as proved by the number of horns which ornament the piles of stones near many of the villages. In Spiti the Burrel horns are common, but I only noticed horns of the Ibex in the Peen valley.

One reason perhaps of my meeting with no game, was from my not going after it, and rarely halting in the same place two consecutive days. Yet traversing unfrequented mountains as I did, without by chance meeting anything, proves the great scarcity of animals, and similar complaints I have heard made by others. The best shooting in fact about Simla may be had along the road. Pheasants being plentiful and Chakor also all the way to Saraon, the farthest Bungalow as yet completed; five sorts in all being procurable, viz., 1st, the Monal, *Lophophorus Impeyanus*, Latham; 2nd, the Argus, *Cerionis melanocephala*, Gray; 3rd, the Koklas, *Puchrasia Macrolopha*, Lesson; 4th, Kalij, *Euplocomus albocristatus*, Vigors; and 5th, the Cheer, *Phasianus Wallichii*, Hardwicke, the last only being a true pheasant, and perhaps the least attractive of the lot. No painting can do justice to the gorgeous beauty of the Monal, the cock of which is resplendent with burnished azure with a golden iridescence, such as the bird of Juno can only rival in the Old World, or those winged gems, the true humming birds, surpass in the New. A handsomer bird, however, in my opinion is the cock Argus with, when living, its superbly coloured gular sack and head lappets and the beautiful contrast which its white spots of unsullied purity form with the rich warm tints of the body plumage. The koklas and kalij are both also eminently handsome birds, that is the cocks in their spring plumage; the hens of all being more sombre-coloured and less attractive.\*

No person starting for the interior should omit a few articles to enable him to preserve any object of interest he may meet with, such as a pot of arsenical soap, four or five broad mouthed stone jars filled with spirits of wine and well corked (good corks are far preferable to glass stoppers) to receive snakes, bats, &c., and a few small glass

\* Any person desirous of procuring skins or other objects of Natural History, can do so by addressing A. P. Begbie, Esq., Simla, as that gentleman has many Shikarries always employed in collecting and preparing skins. A case containing good skins of all the above pheasants and also skins of the snow pheasant, *Tetraogallus Himalayanus*, Chakor, *Cacabis chakor*, and the black partridge, *Francolinus vulgaris*, in all 24 skins, will cost eighty rupees, a price which those who know the expense attending collections, will not consider excessive.

bottles for insects, filled to near the top with spirit; a dozen quires or so of large bazar paper with a couple of pressing boards and straps for ferns, &c.; a broad mouthed glass bottle with a false bottom of card, filled up with ammonia for capturing and killing moths, and pins and a few soft deal store boxes, pill boxes for shells, a hammer and chisel, compass and telescope.

To economise spirit, a jar should be devoted to the reception of recent captures, into which all animals may first be placed *after removing the entrails*, and allowed to remain for a couple of days. From this jar, they may then be transferred to a store jar, the spirit of which, by this plan, will not require to be changed, the spirit in the first jar alone requiring occasional renewal, as it gets foul by use. Unless an animal is opened and the entrails extracted, it is hopeless to suppose that it will keep well, as the access of the spirit is not sufficiently free to effect the preservation of the contents of the abdomen, not to mention the saving of space as well as the better preservation of the specimen this simple operation secures. All small mammals and lizards, and snakes up to 3 or 4 feet in length are most effectually and easily thus preserved.

It is a mistake too to suppose, as some people do, that a skin can be properly prepared at any time, if once dried. No skin can be properly prepared that has not been preserved with arsenical soap when fresh,—I mean for museum purposes, as of course a coarse hide may be tanned at any time,—and it is best, therefore, never to defer the process till next day, however tired one may be, if the specimen is of interest; neither is it safe to trust to a servant in such matters. Some small work, however, on Taxidermy should be procured by any one who has not previously made the subject a study, and is at the same time anxious to collect during the trip. Skulls of animals are comparatively easy to procure and carry, and are always worth so doing; but most people adopt a ruinous plan to prepare them, viz., by macerating in water or burying them. This may clear them of flesh, but it will cause the teeth to fall out. Whilst travelling, the best plan is simply to pare off the flesh and dry them, with the ligaments and lower jaw attached, in the sun, extracting the brain through the occipital foramen, without however enlarging the aperture. By this means the teeth remain fixed and the skull can at any subsequent period be properly cleaned and whitened with one or two coats



of whitewash put on and brushed off. Or, if left undisturbed, the small beetles and flesh eating larvæ will very beautifully clean in this country heads thus dried with the flesh on them. The horns too of the sheath-horned ruminants (antelopes, sheep, &c.,) require to be touched with some preservative, especially where inserted in the skin, as they are otherwise liable to be eaten and disfigured by insects.

*July 7th, Mahásu.*—Having completed my preparations, I left Simla on the 7th of July, and marched as far as Mahásu, the first bungalow on the new road. As usual on first starting, I had some difficulty with the coolies, some of the loads proving too heavy, and I at that time having several double loads carried by two men, a plan productive of much annoyance, and which I afterwards abandoned. The bungalow, like all those along the new road, was a very clean and comfortable one, and prettily situated in an open forest of the usual character of the pine and cedar forests around Simla. As far as Bowlee bungalow, the road is excellent, and the ascents and descents are mostly very gradual. Between Bowlee and Saraon (a few miles beyond which the road terminates abruptly) the road is generally good, but contains some very long and steep ascents; the Nogri bungalow being situated on a feeder of the Sutlej at about the height of Rampore, and hardly, I should suppose, in a situation exempt from malaria during autumn.

The views obtainable from many parts of this road are beautiful in the extreme, the Sutlej being often seen winding its way many thousand feet below the road, through a wild rocky glen, bounded on either side by precipitous mountains, clothed to their very summits with primeval forest. In other places, extensive patches of cultivation and thriving villages may be noticed, embosomed in fruit trees, among which the apricot, walnut and peach are most conspicuous, and whose waving crops of bátu, of a deep crimson when ripe, offer a striking contrast to the paler and more subdued tints of other cereals. The hills round Simla, however, are in many directions singularly bare of trees, the station itself being rather centrally situated in a wooded tract of rather circumscribed dimensions. All travellers in the Himalayas are acquainted with the very capricious manner in which one face of a hill will be clothed with forest, whilst the rest is bare; but much of the bareness of the hills round Simla is, I think,

unquestionably produced by clearing ; and one of the most disagreeable sounds to me, occasionally to be heard in Simla itself, is that of the woodman's axe slowly but steadily clearing a way through those umbrageous forests, at present the ornament and glory of the station. Closely connected with this subject is that of the supply of water, which of late years has been found to fail and prove inadequate to the wants of the inhabitants ; this may in part arise from the growth of the place, but the actual supply of water furnished by the springs has, on undoubted testimony, alarmingly diminished of late years. The authorities have driven a tunnel into the hill side not far from the Church, with the view of tapping fresh sources of supply, but taking the nature of the ground into consideration, I have no great hopes of the success of the plan. A far more certain and practicable method, it seems to me, would be to construct a series of dams across the narrow nullah intersecting the station, giving rise thereby to a number of small pools one above the other, whose aggregate capacity would be very considerable, some of which might be reserved for drinking, and the others for washing and general purposes. As the nullah has a rocky bed, no difficulty would be experienced in constructing masonry dams of the requisite strength and proportions. A few miles from Simla the road passes through a tunnel of some hundred yards in length, excavated in massive schists, but very wet and slushy under foot from incessant drippings from the roof, to drain off which no provision appears to have been made.

8th, *Fagu*, 8718 ft.\*—This bungalow is situated on the old road, but is much frequented being an easy march from Simla, and though small, prettily situated. The road between Mahásu and Fágu is well wooded and very picturesque, the road in many places affording a

\* All heights marked thus \* are from observations made with two carefully compared boiling-point thermometers by my colleague Mr. Mallet, and the few taken by myself are made with an ordinary thermometer corrected by comparison with the above instruments. The tables used in calculation are Boileau's tables published at Meerut in 1849. It is important to state this, as the tables of Col. Sykes supplied with the boiling-point thermometers, (Casella's Thermohypsometer) give a much too low result, amounting at the Parang Pass to a difference—991—compared with result of a calculation on the same observation by Boileau's formula, which, as far as my scanty means of verification go, appears to give the more correct result. The following are the heights determined by my colleague Mr. Mallet in a part of the valley unvisited by me.

Shalkar, 10089. Changrizang, 12420. Huling, 10598.

Sumra, 10624. Lari, 10845. Thabo, 10804. Po, 11424.

The heights are those of the camping ground of the respective villages.



profusion of wild strawberries which, though of a beautiful colour, are watery and insipid. Near Fagu I first obtained two species of limax which I believe are undescribed, and which are not uncommon along the southern side of the Sutlej at elevations between 6000 and 9000 feet. The largest may be thus described:—

*Limax altivagus*, n. s. Corpore limaciformi, pallio lente-granuloso, dorso rugose reticulato, more frondis brassicæ, colore virescente-fusco sive lutescente-fulvo, interdum nigrescente, et rarissime pallide aurantiaco pallio, minus colorato corpore. Tentaculis quatuor nigris, capite nigro, infra pallescente. Ano ad dextrum latus pallii, prope marginem posito, ad mediam partem vix attingente. Longitudinis (corpore extenso) 9 unc. Habitat montibus cis-Sutlejensibus prope Fagu Narkanda, Saraon &c. 6000 ad 9000.

This limax is rather variable in colour, and large specimens, when in motion and extended, exceed 9 inches, though their ordinary dimension is about 6. It feeds on fungi.

The second species of limax is much smaller and rather more elegantly-shaped, and occupies the same tract of country, and is perhaps rather more numerous, though the first is far from uncommon.

*Limax modestus* n. s. Corpore limaciformi, postea acuminato, colore cinereo, fuscis punctis notato; dorso duobus lineis maculosis cateniformibus ornato, a sese et a margine equidistantibus et a pallio usque ad extremitatem extensis, spatio his lineis incluso paullo fuscente et elegante fuscis lineis striato et marmorato. Tentaculis quatuor rubro-fuscis. Longitudinis  $1\frac{1}{2}$  unc. Habitat cum precedente.

*Vitrina monticola*, B. also accompanies the above. The animal is about 2 inches long, colour pale reddish brown, paler beneath. Tentacles dark. Spire covered by mantle. A thin dorsal keel down the body in front of the shell; shell carried in the centre of the body. Tail compressed, obliquely wrinkled, and truncated. Anus situated at the extremity with a small overhanging tentacular pore.

This vitrina is very generally distributed, though individuals are nowhere numerous, and it appears to be the favourite food of the toad.

9th, Theog.\* 7192 ft. A short march to the next bungalow on the new road, distance about six miles. I was much annoyed at this bungalow, as well as at some others, by the multitude of house flies which at this season are perfect pests. A pair of swallows had com-

menced a nest in the verandah, but did not appear to prey on the flies which swarmed in the rooms, though it may have been timidity which prevented their entering. Along the road, one or two species of flower-eating beetles were common, and exhibited considerable agility and powers of perception, flying away readily on any attempt to capture them. Towards dusk, numbers of a beetle having the heavy flight of our English *melolontha* made their appearance, but it was too dark to capture many, though flying round the bungalow in considerable numbers.

10th, *Matiana*, 7700 ft.\*—A rather pretty march, the road winding round the head of the deep valley beneath Theog. Pheasants are plentiful, and in the glens I heard the bark of the kakar (*styloceros*), but the vegetation was too thick to afford much chance of sport to a single gun. Musk deer are found near *Matiana*, and in winter time bears.

11th, *Narkanda*, 8796 ft.\*—A longish march, but along a very pretty road: indeed no part of the hills I think prettier than the country round *Narkanda*. The bungalow is situated on the ridge separating the drainage of the Sutlej and Jumna, and close to the verge of a magnificent forest. From the verandah a fine view is obtained of the lower slopes of the hills, leading down to the Sutlej and the village of *Kotgurh* at which is a resident Missionary (recently deceased), who has a tolerably attended school near the *dâk* bungalow. The mission house is a neat building with vines trained over the verandah, and the native catechist is also provided with a very neat cottage close by. *Narkanda* being the last place at which potatoes are procurable, the traveller should lay in a supply there, as no sort of vegetable is procurable in the higher hills, except the green leaves of the *bâtu* which form tolerable spinage, and the young shoots of fern which are not unpalatable. About *Narkanda* many *rous* trees are found, which make capital walking sticks, the wood being hard and straight grained. Hazel trees are also plentiful, the nuts ripening about the end of August.

12th, *Kotgurh*.—After leaving *Narkanda*, the road winds through fine forest, many of the pines and cedars being truly magnificent trees. *Kotgurh* is situated on the old road at an elevation, I should think, of less than 6000 ft., and about four miles from the Sutlej. The first half of the march is along the new road to a spot where a small



wooden temple is erected, where the footpath to Kotgurh branches off. The descent from this is in places very steep, and after rain rather difficult, from the slippery nature of the stiff yellow clay over which the path lies. At Kotgurh, besides the Missionary stationed there, is a gentleman of the name of Berkeley who is engaged in tea-planting; and a retired officer, named Begbie, also has a house in the neighbourhood which he occasionally occupies. Mr. Berkeley's house is near the highest limit at which the tea-plant will thrive, and his chief plantations are at a somewhat lower level; but the quality of the soil has also considerable influence, and varies considerably, probably according to the nature of the rock immediately beneath it. Kotgurh, from its low elevation, is hot and sultry, and not exempt, I should think, from malarious fever. The vegetation round it is rank in all open spots, and rice is grown just below it. Bears and leopards are found in the forest above it, the last animal being far more numerous than might be suspected. Several have been taken in traps near Simla this season, (as many as three in one month by the same individual), but yet it is an animal which is never seen abroad in the day time. The bears are the black hill bear (*Ursus Himalayanus*) a perfectly distinct animal from the black bear of the plains, and considerably smaller, to judge by the relative size of the skulls of the two species. The plain bear is in fact another genus (*Procheilus labiatus*) and the skulls may be readily discriminated, as the former has six incisor teeth in the upper jaw, whilst the latter has but four.

15th, *Nirt-chokee*.—Nirt is situated on the banks of the Sutlej, and the descent to it from Kotgurh is in many places extremely steep and difficult. The Sutlej is here under 100 yards broad, and rushes over a rocky bed, the whole valley being so contracted as to afford few open patches fit for cultivation on either side. At this low level the heat is very great, and the hills are covered with the same sort of cactus which occurs round Subathu and Kasouli. Pipal trees are also met with near villages, but all of them planted, and none occur much above Rampur. Remnants of terraces of old river shingle may here and there be noticed at different heights; some at not less than 500 feet above the present level of the river. These evidences of former river action have induced some writers to indulge in fanciful speculations respecting vast cataclysms, and the sudden disrup-

tion of rocky lake barriers along the course of the Sutlej, but they are rather to be regarded as a gauge whereby we may estimate the extent to which the Sutlej has deepened its channel by the ordinary process of erosion during the most recent geologic periods. Cataclysms produced by landslips or the descent of glaciers into a river bed, however devastating in their effects, are quite incapable of giving rise to such regular deposits of sand and shingle as constitute the elevated terraces along the Sutlej; neither have I anywhere seen deposits of such a nature as to induce the belief of their lacustrine origin, as they every where present the appearance of ordinary river sands and shingle, such as in the present day are forming in existing river channels. In the village is a Hindoo temple in a ruinous condition, with images of Bulls and Lingums, and the whole place presents an aspect of dilapidation and decay.

16th, *Rampur*.—Passed the village of Datnaga, near which the Sutlej is spanned by a jhula bridge. A good deal of cultivation exists hereabouts, and transplanting rice was being carried on vigorously. The town of Rampur is snugly situated within a bend of the river, which here rushes impetuously through a narrow rocky bed, hurrying down numberless pine logs at a rate of some six miles an hour.

Above the town are some commodious native houses, a temple and a large, well built room facing the river, for the convenience of travellers. In the temple are two figures of Devi and some other goddess, with silver faces and a profusion of long hair. When I was there, these images were brought out and paraded, with music and attendants waving chouries over them. They were carried on a litter placed on two very long and elastic poles, supported by a man at either end, after the fashion of a sedan chair; and at intervals the bearers would, by means of the elastic poles, jerk the images violently up and down, causing their long ringlets to fly about their ears in a mad fashion, to the intense delight of the spectators, comprising many of the elders and most of the juveniles of Rampur. This strange manœuvre was, I think, a clumsy attempt to represent the inspiration and actual presence of the divinity in her idol, thereby imparting to it life and motion, as in Bengal the idol of Kali is, during the festival of the Durga Pujah, supposed to be animated by the spirit of the goddess, and is thrown away uncared for, when the “real presence” (to borrow the appropriate catholic phrase) is supposed to



be no longer in force. How clumsy, however, the whole performance, when compared with the somewhat similar, but vastly more refined deceptions of the inspiration of the Pythoness or Priestess of Apollo when delivering the responses of the god.

“ Cui talia fanti

Ante fores, subito non vultus, non color unus,  
Non comptæ mansere comæ, sed pectus anhelum,  
Et rabie fera corda tument, majorque videri,  
Nec mortale sonans, afflata est numine quando  
Jam propiore dei.” *Virg. Æneid.* vi. 46.

I have subsequently been told that this ceremony is had recourse to, when some special visitation is to be averted, and in the present instance was intended to put a stop to the severe cattle murrain which this year has swept the hills and caused immense loss in Bissahir and Kunawar, affecting both cattle, sheep and goats ; and these animals had been driven away from most of the villages I passed through in the valleys to the higher mountains, in order to escape the disease, which is most prevalent at lower levels. The houses at Rampur are all covered with thick rough slates, and are many of them built in the form of a square, with an open courtyard in the centre into which the rooms open. Cloth and blankets are manufactured here, and a little trade is carried on by means of mules, of which I noticed a good number grazing in the neighbourhood ; but the bazaar is wretchedly supplied, and nothing but the most ordinary necessities is procurable.

17th, *Gaora*.—The road, after quitting Rampur, keeps for some distance along the Sutlej, and then rises up a steep but picturesque ascent to the village of Gaora, prettily situated on a rocky but well wooded slope. The apricot harvest is now being collected, and every house top is seen covered with the fruit spread out to dry. The finer fruit is dried or eaten fresh, but the poorer is heaped together, till it becomes pulpy, and then thrown away, after extracting the stones, the kernels being reserved to make oil. A familiar plant common round Gaora, and recalling many pleasing reminiscences, is the mistletoe, which grows here as luxuriantly on apple trees as in any orchard or park of old England. Blackberries too are tolerably common and very pleasantly flavoured, and also a small berry which grows in astonishing profusion, and is, I think, a species of *carissa* or some

allied plant. These berries are pleasant to eat either raw or stewed; and their expressed juice is of an extremely dark and beautiful purple, and, when mixed with a proper amount of sugar and spirit, and flavoured with a few peach kernels, forms an extremely elegant liqueur. The hemp plant grows here in the utmost profusion as a common weed, and indeed everywhere in this part of the Sutlej valley below 7000 feet, but does not seem to be cultivated, though the soil and climate appear to suit it perfectly. It being very wet and the ground completely sodden, I preferred putting up in the verandah of an empty cow-house to my tent, though the midges and fleas in such places are usually very annoying. I was provided, however, with musquitoe curtains, which relieved me almost completely from the attacks of these tiny but implacable enemies, and I would advise no one who values a good night's rest, to travel unprovided with this article.

18th, *Saraon*, 6632 ft.\*—A rather severe march, the road about half way descending into a deep valley and ascending again on the opposite side by a very steep and in some places difficult path, and joining the new road a few miles from Saraon bungalow, which is the last one completed along the new road. During the summer months, this is the residence of the Bissahir Rajah, a stout sensible young man who speaks English tolerably, and who rode down alone to the bungalow, on hearing of the arrival of a European, unattended by the ragged mob of followers which natives of his rank usually consider necessary for their dignity to carry along with them.

19th, *Taranda*.—A rather long but very picturesque march, for the first few miles along the new road, through pine forest, or along the sides of precipitous rocky glens opening down to the Sutlej, of which glimpses are now and then caught. The camping ground is situated on the crest of a rather lofty spur, in the midst of a forest of really magnificent cedars, at some little distance above the village.

20th, *Nachár*.—About six miles from the last camping ground is the Paindah bungalow which, though finished, is not regularly opened. Before reaching it, the road descends into and crosses a large valley, on the opposite side of which the bungalow is built. Bears, I believe are found in the vicinity, and I have rarely seen ground which I should think would afford them better cover. Before reaching Nachár, a large village is passed, situated on the verge of a forest of the most magnificent cedars I ever beheld. The profound stillness which



reigned here, combined with the subdued light caused by the spreading boughs of these majestic trees, (the only sound indicative of life being the melancholy coo of a wood pigeon,) exerted a very solemn influence on the mind, such as all must have experienced who have trodden alone the depths of a pine forest either in India or Europe. One of the largest of these trees measured 36 feet in girth, and at about 10 feet from the ground divided into two trunks, each in itself a tree of superb dimensions. No other tree near the road approached this in size, but numbers of single trees must have measured fully 20 feet in girth, and in their growth were as straight as arrows.

By the time I reached Nachár, the rain was falling in torrents, and I was glad to take shelter in a sort of rest house, in preference to my tent which was dripping wet. The building was open on all sides, being merely a pent roof of massive shingles supported by pillars formed of short cedar logs laid cross-ways on each other, and underneath having a sort of kitchen in which the servants found shelter and were enabled to prepare dinner. The houses in Bissahir are usually regular and substantial buildings, built of alternate courses of cedar timbers and rubble masonry, and often two or three stories high, with projecting eaves and a balcony running round the upper story, which gives them much the appearance of a Swiss chalet. They have often pent roofs, formed of a double layer of stout cedar planks or shingles, some three inches or more in thickness, rudely dressed with an axe, and ranged at right angles to the ridge pole. These, as may be imagined, form a very inadequate protection from the rain, but have the advantage of giving ready exit to smoke, through the gaping interstices between the planks. Another form of roof equally prevalent is flat topped and formed of beaten clay. On these roofs grain and fruit are spread out to dry, as opportunities offer for so doing between the showers during the rainy season.

21st, *Chargaon*.—Quitting Nachár the road descends to the Sutlej at Wangtu (or, as it is pronounced, Oángtu) where there is a handsome wooden bridge. The river here rushes through a narrow rocky channel not more than sixty feet broad. On either side two square towers are erected of alternate courses of cedar beams and large stones. From beneath these, three tiers of pine trees project over the river, having a considerable upward slant, and each tier consisting of four large trees a little advanced beyond the one supporting it, the whole

firmly held down by the towers or gateways, which, for greater security, are filled at each side of the roadway with stones to the height of three or four feet. From the ends of the uppermost or most projecting tier of logs, two trees are laid across, spanning the river, and on which a roadway of planks is firmly secured, forming a very safe and easy bridge over which a horse might easily be taken. Shortly after passing the bridge, the Wangur river is crossed, a turbulent brawling stream which descends from the Baba pass and enters the Sutlej above Wangtu. After crossing the Wangur, the road ascends a ridge which is so precipitously scarp'd by the Sutlej that no path round it exists, though one could readily be made at a small cost and a troublesome climb thereby saved. From the summit of this ridge the road descends gradually to the Sutlej, along which it keeps till near Chargaon, which is situated on a cultivated slope at some height above the river. In some places the road is very steep and difficult, and had been much damaged by the heavy rain of the previous day. Near Chargaon I saw a pair of Goral (*nemorhædus*) and some pigeons, among the superb cliffs overhanging the Sutlej. On the opposite side of the river, the banks were very precipitous and scored by numberless "shoots," down which pine logs would occasionally come rolling and plunging with heavy thud into the river below. So steep, however, is the incline, and so clumsy the mode of sending down the timber, that I think more wood is spoiled, than finds its way into the river in a sound state, and when in the river, the loss among the logs, by stranding or remaining in some eddy or reach till they rot, must constitute a very large percentage on the number that eventually reach the plains. This state of things will of course continue as long as any timber merchant or agent is permitted without any let or hindrance to destroy whole forests, by a reckless system of clearing, having nothing in view but his own profits, and not caring if fifty years hence not a stick remained large enough to make the handle of a broom out of. This is surely a matter calling for Government interference, though a topic I cannot enlarge on here, but content myself with expressing a hope, that something may be effected to retard this wholesale and wanton destruction of our forests, and a remedy not applied only when the mischief done has almost become irremediable.

22nd, Meru.—A short march of not more than seven miles. The camping ground, a dirty spot in the midst of the village.



23rd, Chini.—A stiff march, the road often steep and difficult, especially near Chini where it is in some places carried along very precipitous ground by means of stairs and scaffolding. Near Chini saw two bears in the valley beneath the road, but sport must have greatly deteriorated since Col. Markham saw bears in the Busba valley, (across the Sutlej,) feeding literally by dozens on the hill sides. At Chini there is a large, but unfinished and comfortless bungalow, and close to it some fine old poplar trees. The village is wretchedly small, though there is a very large spread of cultivation near, and supplies are dear and with difficulty procurable. Height 9096 feet, the village being about 3000 feet above the river.

25th, Pengi.—A short and uninteresting march, the trees in places dwarfed from the close proximity of the uppermost limit of their growth. On the hills across the Sutlej, the highest limit of trees is sharply defined and is somewhere about 12,500 feet. Poplars, apricots and walnuts plentiful and thriving round Pengi, and also excellent blackberries, or the Kunawar representative of that home fruit, which with the addition of a little sugar formed a very palatable desert. In the vestibule of the temple of Devi at this place, I noticed some fine apricots hung up, which called to mind the ancient Roman custom of votive offerings to the rural deities—

“Flava Ceres, tibi sit nostro de rure corona

Spicea, quae templi pendent ante fores.” Tibullus, El. I.

One of my Hindustani servants, who let no opportunity slip of exhibiting their own superiority and contempt for the unsophisticated inhabitants of the hills, enquired of the headman somewhat superciliously, of what use the apricots were to Devi—“Did she eat them?” His reply rather pleased me, for instead of returning an abusive answer, as any Hindustani would have done in the plains under such provocation, he quietly asked who it was that caused those same apricots to grow. “If you” he continued “can make so much as one such apricot grow, I myself will give you five rupees for it.” This reply, made with much dignity and without any temper, was evidently not what my servant expected, and completely silenced him, for he had sense to perceive that his sarcasm had failed to produce any irritation, and that he was getting the worst of the discussion.

At this village I got the skin of the lesser flying squirrel, the fur of which is beautifully soft; the larger species I have shot at dusk in my own compound in Simla, and both appear pretty generally diffused and not rare, though from their erepuscular habits they are not often seen.

26th, *Gaugera*, 11294 ft.\*—This is a mere camping ground, about 500 feet below the upper limit of trees. Wild thyme and other flowers abounded and a species of potentilla, with thicker and more downy leaves than that which grows at a lower elevation. Many of the plants which occur at high elevation are possessed of an aromatic fragrance and leaves furnished with down, as though to meet the increased rigour of the climate.

27th, *Lipe*.—On quitting camp, the road immediately commences to ascend, and crosses a pass of some 14000 feet, to which no name is given in the map. Wild flowers were growing in great profusion near the summit among the rocks, and some way down on the other side birches and rhododendrons. Lipe is situated on the northern bank of a considerable stream, which is crossed by means of a wooden bridge. A little above Lipe vast beds of river sands and shingles, some 250 feet thick, are seen reposing on the rocky slopes of the gorge, some 600 feet above the present level of the river; and much of the cultivated land below the village is on a river terrace which has been abandoned by the stream during a comparatively recent period, the river having worn for itself a deep channel, almost a rapid, on the opposite side. Close to the river are extensive vineyards, but the present year has been unfavorable for grapes, especially about Chini where the vines have almost entirely failed. About Lipe there was better promise of fruit, but it was too early in the season when I was there, to get any.

28th, *Tabang*, 11755 ft.\*—A very short march, the road rising considerably from Lipe and crossing a low pass, near the summit of which I noticed small rhubarb plants among the furze covering the hill side, and also a few straggling cypresses, which certainly ill-deserved the poetic epithet of Aerial or lofty cypress,\* being little else than mere bushes. The camping ground is a mere depression in the bleak hill side, above the village. The water of a spring close by was 44°. Not-

\* "Non sine nutanti platano, lentaque sorore  
Flammati Phaethontis et aëria cupressu." Catullus Nup. Pel. et Thet.



withstanding the lowness of the temperature, the larvæ of some insect were numerous in it, and what seemed an aquatic acarus or tick, and a small species of leech, rather less than an inch in length. These quick-scented animals soon found out and attached themselves to some garbage of a sheep, which my servants had left in the water, and I subsequently found these animals to abound in running water both in Bissahir and Spiti. Leeches are known to be one cause of cattle epidemics, especially in excessively wet seasons, as this has been, and it would be interesting to ascertain, by the dissection of cattle which have died of epidemic disease, if they are infested internally by these rapacious creatures; as, if the disease can be traced to this cause, a remedy might easily be applied by carefully debarring the cattle from all access to streams containing them. I myself had no opportunity, as the epidemic among the cattle had occurred in the spring, and most of the survivors had been driven up the mountains to escape its effects.

29th, *Sangnam*.—Early in the morning I was awakened by the flight over my tent of many noisy birds, which I afterwards ascertained to be red-legged crows. These birds are social without being gregarious, and when feeding on the hill side, keep together in small companies, but without forming flocks. Their food consists of wireworms and other insects, which they search for under stones and among tufts of grass, but they are usually very wary, and difficult to approach within range. This is evidently an instinct or caution peculiar to the bird. It cannot be attributed to the result of experience, as they have no reason to regard man as their enemy, being unmolested and rarely in their lives hearing the report of a gun. After quitting camp, commenced the ascent of the Ranang pass, 14361 feet, the ascent being gradual and easy. From the summit a fine view is obtained of the Sangnam valley and the hills across the Phanam river, on the opposite bank of which Sangnam is situated, and in the far distance the snowy peaks surrounding the Manirang pass, towering up to 21845 ft. The descent to Sangnam is very abrupt, and the river is crossed by a wooden bridge a little above the village. A good breadth of land was under cultivation along the river above the village, and beans were being gathered in, though not quite ripe. Apricots were the only fruit-trees I remarked, and their fruit was also being gathered. Flour was only five seers per rupee, or one seer dearer

than at the last village. Many of the cattle had long hair, due probably to an admixture of yàk blood, but the place is too low and hot for yàks to bear at this season, and I saw none before crossing into Spiti. Blue pigeons very numerous.

30th, *Thorapa*, 10548 ft.\* (or Kajakajing).—The road up the valley keeps along the course of the stream, through cultivation, and sometimes descends into its bed. At the village of Rupa, the last or highest up the valley, procured fresh coolies and pushed on a few miles to the camping ground, at which is some cultivation but no village. On the valley sides, noticed in places thick beds of river shingle and boulder, sometimes 400 feet thick. Hills bare and uninteresting, little game beyond a few chakor and pigeons, but procured the skull of a snow bear shot two months previously, an old but small animal, probably a female. These brutes often attack the flocks of sheep when feeding on the mountains, and are accordingly destroyed, when they appear near villages, all the inhabitants turning out for the purpose. In general, however, the people of Bissahir and Kunawar are singularly devoid, for mountaineers, of all taste for sport, though they will occasionally beg a little powder and shot to kill birds with, but very rarely. At the camping ground the wild or scentless briar with its red hips abounded, and also a wild cherry bush two or three feet high, with very palatable bright red fruit, no larger than large currants. Apricot trees were also common, but the fruit, though plentiful, was very small and unripe.

31st, *Sando*, 12451 ft.\*—(Pamachan of the maps.) A very severe and in places difficult march, the road sometimes a precipitous hill side, covered with loose and very slippery slates where great care was requisite to avoid dangerous falls. About half way, the path crossed a broad moraine-like talus of rocky fragments, detached by frost, as I suppose, from the high hill on the right, and as sharp and angular as though fractured the previous year, though doubtless the accumulation of ages. The last part of the road led in many places along the face of vertical crags, where a single false step was inevitable death. The footing was firm and rocky, but often so scanty as to render it necessary to hold on pretty tightly by the hands as well. Early in the day, met a number of Tartars from Spiti with a flock of goats, sheep and donkeys laden with salt on their way to Sangnam. They complained bitterly of the road, which I soon found they had ample



reason to do, and had I not seen them myself, I could never have credited the possibility of any solidungulate animal getting over places which they certainly had done, and though convinced of the fact, cannot understand *how* these donkeys get over spots which taxed a man's powers to climb. On the march saw many traces of bears, but none recent, and judged therefrom that their food chiefly consists of roots, grasses, and vegetable matters. Around the camping ground, which is a mere sheepfold in the mountains, gathered a little rhubarb, small and stringy, and along the stream and on the hill side remarked poplar trees and birches.

*August 2nd, Largoo.*—Glacier at the foot of the Mánirang pass. Camp 15521\* feet. The road lies up the course of the stream which descends from the Mánirang pass, and is often rather difficult, from crossing piles of loose stones and coarse gravelly debris precipitated from the hills adjoining it. Snow bridges span the stream in many places at the foot of the pass, and eventually the road fairly enters on the glacier.

It requires a little reflection here to realize the fact that one is actually on a glacier, as nothing is seen around but huge piles of shingle and rocky fragments heaped up in an irregular manner, like some Brobdignagian ploughed field. Long ravines and somewhat anomalous looking pits or depressions are everywhere met with, and occasionally pools of water, which, on closer inspection, are seen to be encircled with walls of ice—not the crystal product, but a dirty looking mass embedding large stones and coarser mud and gravel, and at the surface completely covered up by rocky debris melted out of it. Pitched my tent on a small patch of green sward a few yards square, a little oasis in the midst of an Arctic Sahara. No wood was of course procurable, save a scanty supply I had brought up with me ; but in spite of the cold, I enjoyed greatly the grandeur of the scene, encircled by snowy peaks which seemed to impend over my little camp and among which the avalanches might occasionally be heard crashing and booming with a roar surpassing the heaviest artillery.

A little below the camping ground I met a European descending the pass from the North, attended by a few coolies, and we of course halted and “liquored” together and held a brief conversation as to our respective routes, game, provisions, &c., with regard to which last, he gave me to understand that I had been absurd-

ly imposed on hitherto as to the price of flour, and that every European not a fool, in Ladak, insisted on having sixty seers of flour for the rupee, a statement regarding which I had doubts, notwithstanding the local knowledge of my informant. He informed me that he was Lt. Melville, attached to the Grand Trigonometrical Survey in Kashmir, and eventually accepted the loan of a small sum of money, as his own funds were barely adequate to carry him into Simla. On my return to Simla, however, I discovered that I had been swindled, (alas for the frank Saxon physiognomy of my friend) and Lt. Melville (verus), to whom I wrote, was able to give me some particulars regarding the gentleman who had thus honoured him by assuming his name. He turned out to be a man who had been recently turned out of the Grand Trigonometrical Survey for disreputable practices, and who also, I believe, so conducted himself in Simla as to give the trades-people there a higher opinion of his talents and impudence than of his honesty. To punish the European swindler, however, who exercises his talents in the Upper Provinces is, in the present state of the law and the practical difficulties and expense attending a prosecution at the Presidency, one thousand miles away, far from easy.

*3rd, Camp.*—Northern foot of the Manirang pass, 15273\* feet (Sopana of the Maps.) The ascent of the pass is very steep and extremely laborious, from the heaps of loose debris one is forced to climb over. The labour of climbing over this sort of ground at this height was so severe, that in one or two places I thought I should have fainted from sheer exhaustion, and once or twice rocks and mountains seemed to swim round, so that I was forced to throw myself on my back to avoid falling over the steep rocks I was at the time ascending, the result of which would have been an abrupt termination to my journey and life. On gaining the snow bed near the summit, the path was much easier, though the snow was rather slippery, and there were a few crevasses to be avoided. The summit of the pass is but a little under 19000 ft. (18889\*) and the descent lies over a glacier much finer and larger than that on the south side. Both myself and servants all got severe headaches, but strange to say not till we had effected a considerable descent from the top of the pass: they remained all that evening, but left no traces the next morning. Spirits I believe only aggravate the headaches, and I contented myself after my



hard day's work with a rasher of bacon and two cups of hot coffee, before turning in for the night. The camping ground was four hundred feet below the upper limit of furze and on the opposite side of a stream issuing from the glacier, which had to be forded, a most unpleasant operation in such cold water, though not reaching much above the knees. The glacier on the north face of the pass terminated in a sheer wall of ice, from beneath which a muddy torrent was springing, and the lateral moraine over which the road descended was but little less abrupt. I crossed the Parangla pass, of nearly equal or perhaps greater height, without any headache, the ascent being much more gradual than at the Manirang, and to the excessive exertion which is called for on this pass I attribute, quite as much as to its height, the severe headaches from which all who cross it suffer.

*4th, Māni.*—11893 ft.\*—A short march to the village whence the pass receives its name. A little way below the camping ground, passed the bluff termination of a moraine, some three miles below the spot where the glacier at present terminates. The road generally speaking is easy, over limestone rocks. Wild leeks were growing in great profusion, though I had noticed none the other side of the pass. On first entering the Spiti valley, the traveller is struck with the unexampled bareness and sterility of the hills, which are devoid of even a trace of trees and merely support a few grovelling furze shrubs on the slopes at their base. Though a result of their geological structure, it does not require much geological knowledge to be struck with the extraordinary manner on which the strata composing them are twisted about, or with their extremely sharp and serrated outline which far surpasses any examples of the kind either in India or Europe. Another marked peculiarity is the enormous heaps of angular debris of rock, which in many places cumber the ground, and clearly result from the severity of the winter frost, unmodified as to outline by rain, which, in countries within range of the monsoon, would soon disperse, or at all events greatly smooth down and outspread such heaps of loose incoherent material. This last surface peculiarity far more impresses one with the sense of desolation, and one's entire separation from the Cis-Himalayan countries, than the bare hills whose mural precipices and serrated peaks bound the landscape on every side. After a sharp descent, the village of Mani is reached, situated at a height of 11939 ft.\* on a plateau of old river alluvium. The heat here during the

day was intense, and inside a tent the thermometer rose to over  $100^{\circ}$ . The temperature of the air may be taken at however about  $85^{\circ}$  at midday, sinking to  $45^{\circ}$  at sunrise, which gives a daily range of from 40 to 50 degrees. The whole scene is striking and peculiar and totally unlike anything met with in Cis-Himalayan countries; the bare and precipitous hills of a peculiar and uniform yellow colour, their sharply defined and jagged outline, the total absence of trees, save a few poplars planted about the village, amidst rich crops of wheat and barley, the square flat-topped houses, with their tiny windows, and stores of furze for winter fuel accumulated on the roofs, the yáks and shawl goats grazing among the rocks, and lastly the inhabitants themselves, genuine Tartars in physiognomy, and with their nationality stamped on every particular of their figure, dress or speech, combine to form a complete contrast with the country and people on the opposite side of the pass.

Pitched tents in a rather confined spot a little above the village, and was soon surrounded by an enquiring group of the inhabitants. Unfortunately I had no interpreter or servant who understood the language sufficiently to carry on a conversation, a want which I severely felt, as it precluding my getting information which I was often anxious to obtain.

Both men and women dress in loose coats and trousers of a coarse woollen cloth and puttoes or boots of untanned leather. These boots are very warm and substantial articles, composed of a sole of leather which is turned up all round the foot and stitched to a thick woollen stocking or legging which is tied above the knee. Though rather clumsy in appearance, these boots afford perfect protection against cold and from injury from rough ground or ice; and after a march a cooly may often be seen with a needle and thread, putting a few stitches into a weak place in his boots, which often exhibit signs of having had half a dozen soles added from time to time one over the other. The men wear either conical caps, or ones much the shape of a comfortable travelling cap, and their hair in a pigtail, except the Lamas or priests who are closely cropped. The women wear their hair braided behind in numerous small plaits, often twenty or upwards in number, sometimes tied loosely together at their ends, and sometimes kept equidistant by having their ends passed through a horizontal ribbon half way down the back, the plaits then recalling



to mind the bars of a *gridiron*. Most of the men wear necklaces of large amber beads or turquoise of very irregular shapes, but very frequently an inch or more in diameter. The amber is mostly sulphur-colored and it is by no means easy to purchase a fine necklace, as they seem to be regarded as heir-looms, and are all brought from "Maha-chin." Besides these large beads, the less affluent wear smaller ones of glass, agate or coral, though usually with a few beads of their favorite amber or turquoise intermixed. Some beads are a very clever imitation of dark onyx of Chinese manufacture, which is not readily detected, save on close examination. They are the same I believe as are met with occasionally in Hindustan, where they are called "Solimains," and are greatly prized, though none here can tell where they originally came from.\* The women wear similar

\* I have subsequently been able to procure a good number of these antique agate beads at Benares, and have little doubt that the whole of them are originally derived from the mounds and ruins at Bamean and other spots in the Cabul territory, where gems, beads, coins and other relics of Græco-Bactrian manufactures are found after the rains have ploughed up the soil.

The beads are of all shapes and sizes, spherical, cylindrical, fusiform or barrel shaped, and of various materials, dark agate with white bands, onyx, carnelian, jade, black schist with white bands, lapis lazuli, rock crystal, obsidian (?) blue and white porcelain, and glass and enamel of various colours. Many other sorts of stone as amethyst and bloodstone also occur, but I could not satisfy myself that these were antique, though they possibly may be. The single obsidian bead is cut as a polygon with numerous small faces, and I consider it as obsidian rather than a dark enamel, from its having been drilled, which glass or enamel beads never are, and consequently exhibit a much larger and more irregular or gaping perforation; and as obsidian occurs in Kattiawar, it might have been procured.

The most curious beads of all are, however, of agate or carnelian inlaid with a cream-coloured enamel. Of these I have several patterns, cylindrical, spherical, fusiform or flattened. One round bead is ornamented all over with elongate spots formed by pitting the surface of the carnelian and filling the depression with enamel. Another is ornamented with circles formed in the same way, while the fusiform beads have two narrow circles at either extremity, from which alternately five lines are carried half way down and connected round the middle of the bead by a zig-zag line, like that uniting two layers of cells in a honeycomb. Of this sort of bead I have a curious but rough imitation in enamel which is probably antique, and the same pattern is also wrought on smaller polygonal beads of dark agate. The cylinders are either carnelian or dark agate with four or five cream-coloured beads carried round them. In all these the pattern is engraved as a deep groove on the surface of the agate and then filled in, flush with the surface, with enamel, and so nicely executed are some of these beads that a good glass in well executed specimens fails to reveal the mode of manufacture save in a fractured or weather-worn part.

The better-shaped of these brown beads are largely used for studs and buttons, after being carefully rounded and polished, which last process brings out the white bands in beautiful contrast with the brown colour. This brown is sometimes so intense as to be even black and is merely superficial, being probably produced by some process similar to that now in vogue in Europe, where a similar result is produced by steeping the agate in oil, which sinks into the porous bands of the stone and then boiling it in sulphuric acid which chars the oil and

ornaments, but rarely so large or fine as the men. They also wear white shell bangles imported I believe from China, though India could supply them I should imagine far cheaper, and also head lap-pets of cloth, extending some way down the back and ornamented with large turquoises, glass, &c. Both men and women too invariably carry a small willow-wood cup, some five inches in diameter, a flint and steel at their side, and a leathern tobacco pouch filled with the dry tobacco leaf. The Spiti pipe is of iron, about a foot and a half long, with a small shallow bowl an inch across, and a square fluted stem, half an inch broad and tapering off to a round mouth-piece, but very strong.

Dr. J. G. Gerrard accords but scant justice to these unsophisticated mountaineers, when describing their personal appearance and characteristics in the *Asiatic Researches*. Having passed a severe condemnation on the women for their want of personal charms, to their shortcomings in which respect they have the impudence to add want of virtue also, he proceeds to say, "The men, without any superior pretensions, have their peculiarities less out of place, but they are black, greasy and imbecile, without any noble qualities whatever,"—"such is their general character, and it will apply to the whole nation of Tibetan Tartars." No impartial traveller will admit the truth of this estimate, though in features they may be unprepossessing, if judged by a European standard, in manners coarse and unrefined, and their notions of morality very different from our own. Gerrard is, however, inconsistent with himself; for only on the previous page he accords them a certain amount of praise which he afterwards seems to overlook, but which is founded in a far more candid and philosophical spirit than his subsequent condemnation. "Strangers, especially Europeans, arriving amongst them and passing rapidly on their way, see nothing in the country or inhabitants to raise a favorable impression on their mind. They observe them in black bare-headed groups, timid, squalid and in rags, and every third person a priest, but, however unintelligible their conduct when debating in

stains the stone consequently as far as the oil has penetrated. The white bands are of course mere crystalline layers which have not absorbed any oil and remain in consequence unaffected by the acid. This art is, however, unknown at the present day, to the best of my belief, in India, and these beads are declared by all the writers I have ever questioned, to be brought from the North-West or Cabul.



an unknown dialect about supplies or the propriety of our progress (both of which are doubtful in such a territory), in their houses *we were treated with friendship and hospitality, unaccompanied with that savage feeling which protects a traveller as a guest and betrays him beyond the threshold of his sanctuary.*" And again a little further on, "The absence of female chastity is a singular commentary *to their honest and pacific conduct*, and the other social qualities of their natural society." In the above passages Gerrard himself describes them as hospitable and honest, or in other words possessed of *truth* and *generosity*, two qualities indispensable to and *a pars magna* of true nobility. It must be remembered that in Buddhist countries chastity is a virtue in very slight estimation, and breaches of it viewed in a far other light than among ourselves, and it is absurd therefore to measure the breach of it among Mongolian Buddhists by the standard prevalent amongst ourselves, but utterly unknown among them. As well might a Brahmin argue (which few are so illogical as to do,) the total moral debasement and impiety of Europeans who touch beef, repugnant as the practice is to their religious feelings. The morality or immorality of an action can only be truly estimated with reference to the habits of thought or motive with which it was committed. In Hindustan for instance, the son who shortens his parents' days by stifling his father with the mud of the sacred Ganges when stretched helpless on a sick bed, or burns his mother on her husband's bier, far from being considered in the light of a parricide, is regarded as having performed a pious and exemplary part; and the Christian prelate or Mahomedan conqueror who, out of the pure love of God, dooms heretics to the flames and the sword, is viewed by his respective co-religionists as following the strict line of duty in so doing; and it is the motives which actuated them, and not a difference or disparity of the results, which prevents our regarding such bloody-minded bigots as Mahomed or Calvin with the same detestation as we regard the sordid murderers Burke and Hare.

I cannot quit this subject without remarking on the amiable and pacific disposition of the men of Spiti, in which respect they contrast most favourably with the Hindus and Mahomedans of Hindustan. I have often heard disputes regarding provisions or the loads to be carried, argued with considerable noise and animation, but the idea

of resorting on such occasions to the filthy slaver of abuse which seems to flow spontaneously from the lips of a Hindustani, never seems to occur to them. In Hindustan, the child not long after he can stand will have acquired command of the foulest language, which it is impossible he can understand, and which he vents unchecked in presence of his father or even his female relatives; and this callous indifference is not confined in all cases to natives, as I have heard the servants of English gentlemen lavish the foulest and most abominable abuse on villagers on the slightest grounds within hearing of their masters and without reproof, though it is difficult to understand how any one possessed of refined or gentlemanly feeling can reconcile himself to, or tolerate in his servants, conduct at once so odious, despicable and unjust.

*5th, Danka* 12740 ft. (camp 12416 ft.)—From Main descend into the bed of the Spiti river, which is crossed a little above the village by a fine suspension bridge of considerable length. Throughout Spiti, these bridges are constructed of ropes made of birch or willow twigs. The supports are two stout cables each composed of some twelve or fifteen small ropes, stretched over rude piers on either bank at about five feet apart and firmly secured by being buried deeply beneath the stones forming the piers. Between the main cables, and about two feet below them, a third of smaller dimensions is stretched and supported by light ropes passed over the side cables; and when the bridge is in good order, a passenger treading on the central cable and supporting himself by the ones on either side, can cross a river with perfect ease and safety, far more so than over the best cane bridge of the Eastern Himalayas and Khasia hills, as the cane and bamboo of which they are constructed is far more slippery than the ropes which are used in their place throughout Spiti; when, however, out of repair and the small side ropes supporting the central cable in many places deficient, the job of crossing is trying to the nerves, and actually dangerous.

Along the course of the Spiti river are seen old river terraces or deposits of shingle and sand coarse and feebly stratified, and reaching to a height of some four hundred feet above the present river level. Behind these regular deposits, and both from beneath, and also encroaching over them, rise almost mountainous accumulations of debris precipitated by frost from the abruptly scarped limestone



cliffs bounding the valley. The height of this gravelly mass mainly depends on that of the cliff at whose base it has accumulated, but not uncommonly reaches to 1,500 or 2,000 feet above the river. This incoherent formation has in some places been denuded by atmospheric action, the scanty streams occasionally traversing it being adequate for the purpose, not to mention the former action of the Spiti river, but it is in some places cemented into a firm rock, by the percolation of water depositing calc tuff. This is the case at Danka, a place built on a mass of the consolidated debris rising abruptly 1,100 feet above the river, which by the action of the elements is worn into the most fantastic pinnacles and perfectly honey-combed with irregular cavities, produced by the falling out of huge blocks or the removal of loose earthy portions of this extremely heterogeneous mass. Gerrard in his own quaint language thus describes the place, "Danka itself is perched upon a projecting ledge of conglomerate, which the erosion of time has filed into slender spires, and the percolation of snow eaten away at their bases, till they present a group of turrets and ravines almost deceiving the senses by the effect of natural agents." The camping ground is a small grassy plot some three hundred feet beneath the village, which looks down upon it from the brow of a beetling cliff, round which were flying many blue pigeons and red-legged crows. A small stream close by contained a small species of *Lymnæa* (*L. truncatula*), the sole fresh water mollusk I noticed in the valley.

6th, Geumal.—Crossed the Lingti river by a small suspension bridge, about six miles from Danka to the village of Sanglang. From this to Geumal, which must be at an altitude of nearly 15,000 feet, the road ascends the steep face of the hill, over beds of limestone in which the forms of pentacrinites may be distinguished, till near the village, which is situated among some open flat valleys on dark shales and behind which the hills rise some hundred feet more. The high land on which Geumal is situated is cut into a narrow wedge by the Spiti river and a considerable feeder of the Lingti river which enters below Sanglang, and viewed from Mani has the appearance of an isolated, flattish hill, of horizontal strata, (their dip from that aspect not being seen) rising with majestic cliffs some four and a half thousand feet above the Spiti river which flows at its foot, though in reality it is merely the termination of a lofty spur of land running

down into the Spiti valley from the great boundary chain to the north; the highest peaks near Geumal attaining a height of 16,266 feet, the Spiti river but two miles from this point being about 11,600 feet.

*8th, Kaja*, 12,200 ft.\*—Descend into the Spiti valley to Kaja, a wretched village in an arid and stony plain, but with a fair extent of cultivation along the river. Great numbers of pigeons are found in the neighbourhood. On the open plateau above half way from Genmal came on a large pitfall constructed in the centre of the path, in which in winter animals are sometimes caught, chiefly “burrel” I believe. It was a circular pit with upright sides, about 7 feet deep and 15 in diameter. A projecting rim of slates inclining upwards and inwards was carried round it, over which the earth from the pit was spread and carefully levelled, so as to give the pit the appearance of being a slight rise in the ground and prevent its being seen. An animal coming along the path, in the centre of which this was, could hardly fail to fall in; and, once in, the projecting ledge of slates rendered escape impossible.

*9th, Kiba*, (Gyihbar apud Cunningham and Kibber of the map) A village situated some two miles up from the mouth of the Parilanghi river, at about 13,890 feet. The road passes the village of Ki, with its pretty monastery capping a very steep and commanding hill, and even more picturesque than Danka. The ascent to Kiba is in places difficult for quadrupeds, though the road must be bad indeed which is impracticable to the hardy and semi-caprine ponies of the valley. Kiba is prettily situated on a rocky ridge, beneath which a grassy plot affords a convenient camping ground. Near the village two piles of stones are passed, ornamented, after the usual fashion, with several rough sticks with bits of rag waving from them, and the horns of the “burrel,” numbers of which are killed in winter and their horns attached as trophies to piles of stones near the village. The same piles are erected at the summit of all the passes, and welcome is the sight of these rags, fluttering from many a weather-beaten stick, to the wearied traveller, as he slowly nears the summit and catches sight of them. Nearly opposite the village of Ki (12500 ft.\*) was a large pile of stones covered with inscribed slabs, which are so common in the vicinity of Spiti village. These piles of stones are some 4 feet high by 6 broad on an average, and often a hundred feet



in length. They are covered with flat slates or smooth round boulders, from 6 inches to a foot or more across, inscribed with the mystical formula "*aumi mani padme hun*," or some others which are given by Major Cunningham in his work on Ladak. The same author mentions some piles of far greater length, one of half a mile near Bazzo, and another near Le of 2,200 feet. The characters are Tibetan, or "mediæval Devanagri called Lantsha," the latter I think most frequently in Spiti, the style of execution varying extremely; the inscription being sometimes rudely scratched, at others carefully engraved with elaborate ornamentation, either in sunk or raised characters. Regarding the object of these *Manis*, Cunningham observes:—

"Does a childless man wish for a son? or a merchant about to travel hope for a safe return? Does a husbandman look for a good harvest? or a shepherd for the safety of his flock during the severity of winter? Each goes to a Lama and purchases a slate, which he deposits carefully on the village *Mani*, and returns to his home in full confidence that his prayer will be heard."

11th, Camp, West bank of *Parilanghi* river, 15,427 ft.—As Kiba is the last village in Spiti this side of the Parang pass (in the Map, Parangla, rightly Parang La, *la* being a *pass*) and the nearest village in Rupshu (Rukchu) a distance of six days' march, it became necessary to make preparations accordingly; and I started therefore with some six or eight sheep and goats, each carrying twenty pounds of "suttoo" and flour, for the use of the coolies on the way, secured in goat skin bags across their backs. This day's march was a very short one; the halting-ground a grassy spot at some height above the river and well supplied with spring water of the temperature of 61°.

A small lizard was numerous among the furze bushes, *Mococa Sikkimensis*, and a small *lagomys* inhabited the rocks, though not numerous. Many snow partridges were seen, and I managed to run down and secure a half-fledged bird as large as a chicken. The flesh tasted strongly of the wild leek on which the birds feed. A large flock of upwards of 200 sheep and goats was also encamped here, bringing down borax, each sheep carrying over 20 pounds. Towards evening the whole flock returned from grazing on the hill side, and I watched with interest the process of securing them for the night. For this purpose, numerous hair ropes, some forty feet long, are securely pegged down in parallel

lines, to which the animals are one by one fastened by means of a loop and button they carry on their necks, the goats and sheep being tethered separately. It was pleasing to observe the docility of these animals and the readiness with which they allowed themselves to be tied up. Each of them, on being secured, lay down and was fast asleep before a second had been well secured to the next place on the rope, so that in a surprisingly short space the noise and animation produced by the return of this large flock was exchanged for the most perfect stillness. The encampment was protected from the wind by the bags of borax piled into a low wall, and guarded by several fine but savage mastiffs. By day-break the whole flock was once more in motion with its freight towards Spiti.

*12th, Camp at the foot of the Parang pass, at 16,448 ft.*—Cross the Parilanghi river, and shortly afterwards ascend the camping ground, a bleak bare valley without the smallest shrub on the bare rocks. The coolies having brought up little or no fuel, all passed an uncomfortable night, a high wind often howling up the pass with occasional sleet, and the only fuel procurable being a little dried ass's dung scattered along the road. Another large flock of goats with borax passed in the afternoon *en route* to Spiti and Kulu.

*13th, Camp, east bank of the Pará river, north of the pass, at 16,163 ft.*—The ascent to the pass is steep but far from difficult; a little snow is met with in hollows and sheltered places, but the road is free of snow to the summit. The crest of the pass is a rocky ridge of vertical limestone strata, forming a gap between high snowy peaks on either hand. From this rocky ridge one steps off on to a fine glacier, which is seen filling up the valley beneath, and which is mainly augmented by the gradual descent of lateral glaciers and ice from the high snowy peaks to the west. Few crevasses exist in this glacier, and the descent over it is gradual and easy, though there are some awkward bits of road just after quitting it, where the ground is very steep and the road creeps along the chasm that yawns between the mountain side on one hand and the glacier on the other, and which is produced by the melting of the glacier in contact with the dark warm rocks of the valley. The summit of the pass I determined by a subsequent observation to be 19,132 ft. which I believe to be very nearly correct, though Cunningham makes it only 18,502 ft. This difference of 630 ft. is the more remarkable as three heights in the Spiti valley



given by Cunningham give a mean excess of + 781 feet over my determinations, and the Chomoriri Lake also as much as + 728 over what I make it. I am not so sure that the height of the pass is so much too low, as I am that the other heights are too high; and the estimate of the pass made by gentlemen on the G. T. Survey whom I met, leads me to incline towards my own or the higher estimate: but as far as I can judge, Col. Cunningham's observations of heights as compared with mine, exhibit an increasing proportionate difference from 17,000 ft.; this difference being — for all heights above 17,000 ft. and + for those below. The Parang pass, by me made 19,132 ft., exhibiting the extreme difference of — 630 ft.; whilst Lari, at 10,845 ft., exhibits a gain of + 1,049 ft. according to Col. Cunningham. At the camping ground the Para river is already a considerable stream, spread over a wide channel in numerous small streams, some of which, however, at midday are over the knees, and the sheep and goats required to be unladen before crossing.

14th.—*Camp on the Para river, a few miles above the mouth of the Chomoriri valley.* Day very inclement, rain and sleet falling and new snow whitening all the peaks around. Met large flocks of sheep and goats hurrying on towards the pass. The Para river receives three considerable tributaries from the eastward, in whose valleys thick deposits of old river gravel are seen, forming steep cliffs along the river course, and fully one hundred feet thick.

15th.—*Camp at South end of Chomoriri Lake, 14,272 ft.* The temperature of the water was  $56^{\circ} 4'$ , that of the air  $51^{\circ}$  and a stiff north-easterly wind. The waters of the lake are beautifully clear and pleasant tasted, though they are stated by the natives to be unwholesome, which I think may possibly be the result of some superstition. Col. Cunningham states that the lake has "no outlet, and its waters are consequently brackish, *although not very perceptibly so to the taste.*" This question of an outlet to the lake is important, but not having read the above passage or being aware that others have stated the same thing, I did not ascertain if such was really the case. Any how I think that there can be no question that the lake has an ample outlet for its waters, though very probably not a visible one. Above Mani, a sort of small lake is found by a talus of gravel and rocky accumulation stretching across the valley and damming up the stream from the glacier; but considerable percolation is always going

on, and gives rise a little way below the obstruction to a stream as large as that above it. In like manner I believe the Chomoriri lake is relieved of its superfluous waters; at all events a gentleman connected with the G. T. Survey, whom I met near the mouth of the Chomoriri valley, informed me that the stream I saw entering the Para river at that spot came from the lake, and the following extracts from Col. Cunningham's work I think incontestibly prove that some outlet the lake *must* have. "On the 18th September I fixed a pole in the water which I examined twice during the day and again early the next morning; but I find no perceptible difference between *the levels of the day and night, the extra quantity of water that is supplied during the day must therefore be compensated by the greater evaporation during the heat of the day*. In the same month of the year, Dr. Gerrard could not find any water-mark above *five feet* which he consequently fixed as the limit of fluctuation, but I doubt if the rise and fall of the lake *amount to so much as one foot*." Again, "Towards the end of May or the beginning of June, the ice breaks up and melts, and by the end of July the surface of the lake attains its highest level, which from the water-marks that I saw *cannot be more than one foot above the winter level*." With this estimate I fully concur, though Dr. Gerrard may have noticed rubbish and rejectamenta heaped by gales to leeward to a greater height. Now, if we consider the manner in which streams descending from snow swell during the day, several of which enter the lake, it amounts to demonstration that the lake must have an outlet of some sort, not to exhibit a greater fluctuation than might almost be accounted for in a large sheet of water by the mere force of a strong wind. Mere evaporation could never hold the balance so nicely or dispose of the vast body of water the lake must receive from the surrounding country which it drains, when the ice and snow melt over hundreds of square miles and are precipitated into it.

Col. Cunningham classes this lake with the others which constitute the old lake system of Ladak, of which the existing lakes, large and numerous as they are, form but mere remnants. Geographically perhaps this view is true, but lake Chomoriri owes its existence to very peculiar local causes, and the same climatal deficiency which has dwarfed the other lakes of Ladak and converted some of them from fresh water to salt, has paradoxically enough actually given rise



to lake Chomoriri, which a restoration of a more humid climate, such as formerly existed, would very speedily once more obliterate.

How far the theory which I have formed regarding lake Chomoriri is applicable to any of the other lakes of Ladak, I cannot say ; but a glance at the map suggests such a possibility, as some of them seem to be, what I take this lake to be, a *river valley* dammed up, in consequence of changed climatal condition and a *diminished rain-fall*. In two important points, this lake differs from those which at present constitute the remnants of the old lake system of Ladak.

1st.—It nowhere affords any indication of having ever obtained larger dimensions than it at present occupies.

2nd.—Its waters, though they abound in animaleulæ (*entomostraca*), do not yield a single mollusk ; nor are any shells to be found in the sand and shingle along its banks, which is merely such an accumulation (often a thick one) as the mountain torrents pouring down from the neighbouring hills have spread out along its shore.

The diagram in the annexed plate will help to explain better than description how a river valley has been converted into a lake, and the peculiar configuration of the ground which has aided such a result. By this sketch it will be seen that the valley in which Chomoriri lake is situated, is, not far above where it opens into the valley of the Para river, much narrowed and constricted by hills which approach within less than a mile of each other, the valley expanding to a breadth of several miles higher up. Not far above this narrow part of the valley a large stream, which when I crossed it had two channels with water rising above the knees, enters and turning round abruptly runs into the Para river. This large stream sweeps down a large quantity of boulders and gravel which it spreads over the valley in the form of a huge bank, on the summit of which it scores ever changing channels, and which entirely shuts out all view of the lake to any person ascending from the Para river, till he has attained its summit and crossed the stream which has caused the obstruction. The rise over this bar from the Para river seemed much steeper than the descent towards the lake, which it will be seen is nothing more than the drainage of the main valley dammed up by a barrier raised by a powerful affluent stream, favoured somewhat by the configuration of the ground, but also by the inability of the recipient stream to remove that shingle swept into it by one of its feeders and

to maintain a sufficient scour to keep clear its own channel. The result is of course a lake. I am not sufficiently acquainted with the surrounding country to account for the feeder becoming more powerful than the stream into which it falls; it is evidently a result of change of climate, and it is quite certain that if a considerable body of water was again supplied to the lake, it would speedily overtop its present barrier, cut a channel through it and eventually drain itself, the only requisite being an adequate supply of water to remove the obstructions brought down by its feeders and to maintain a proper preponderance of the main stream over its tributaries. To bring about such a state of things, a change of level only is required, such as we know has repeatedly taken place, with its corresponding change in the amount of rain fall; and the same phenomenon, viz. an elevating movement, which has dwarfed the once mighty inland seas of Ladak by curtailing their supply of rain water, has in some places, owing to peculiar and local circumstances, produced precisely opposite phenomena and actually given rise to lakes where none existed before.

The bottom of the lake is in some places near the shore covered with waving patches of a long grass-like weed; but I noticed no fish, though I doubt their absence from the lake, as in the stream below it I noticed small fish, though I was unable to secure any, and in the Spiti river I observed fish in water of only 41°.

Several wild horses or kiangs inhabit the shores of the lake, usually occupying the gravelly plain spread out across its eastern end, though when alarmed they take to the hills. Burrel are I believe to be got among the hills, and I was told of a flock of *ovis ammon* which used to frequent the neighbourhood of the lake, but which was driven away some years since by an unusually severe winter and has not been seen since.

A few old geese and several flocks of goslings just commencing to fly were the only birds I saw. One large flock of goslings I noticed on the side of a high hill, and at sight of me they ascended to a much greater height than I cared to follow them to on a march. A few *totani* or snippets were seen in a marshy flat at the mouth of the valley, but I was disappointed at the paucity of birds, after the accounts I had heard of their abundance.

16th, Korzo, 14,450 ft.—The road lies along the west border of the



lake and crosses a small ridge jutting down to the water just before reaching Korzo. The village is a wretchedly small one, situated on the opposite side of a small feeder of the lake, on a bare rocky eminence; yet from the square castellated form of the houses, with mere slits for windows, and their quaint ornamentation by poles with streamers and bunches of yaks' hair at the end, it presents rather a picturesque appearance. On my arrival I was waited on by the headman bringing a "nuzzar" of dried apricots. He was smartly dressed according to Tibetan ideas, and had on a pair of veritable Chinese boots with thick soles and tops of handsome embroidered silk, of which he seemed proud; indeed Chinese articles are esteemed here much as Paris goods are in London.

A Kashmiri Mahomedan of a very Jewish cast of countenance acted as interpreter, though not very fluently, and I soon found that provisions were very scarce and dear. The day was remarkably fine, quite a contrast to the weather of the last few days, and I should have been glad to have devoted a fortnight to the examination of the neighbourhood of the lake, but the great difficulty of procuring supplies and the appearance of the mountains, which during the last few days had become sheeted with snow far and wide, coupled with a warning I received that in so severe a season as the present has been the Parang Pass might any day become closed for laden coolies, determined me to hasten my departure back again towards Spiti, and accordingly I gave orders for returning on the following day. It now appeared that no fresh coolies were procurable, as the few available men of the village had been carried off by some other travellers; but the headman said the coolies whom I had brought with me, would gladly act again on my return; this, however, I found they stoutly refused to do, and they began preparing to move soon after being informed what was expected of them. In the afternoon word was brought that the Spiti coolies were moving off with their goats, and the headman, perceiving the urgent necessity of "taking action" in the matter, (though I warrant he never heard of father Daly's tactics or the Galway contract), sallied forth with some followers, and, aided by my Simla coolies, captured and brought back the run-aways. Hereupon the most tremendous uproar ensued, the Spiti coolies stoutly declaring that they would not lay a finger on the baggage, and my men insisting in equally loud tones that they must

and should. Whilst the row lasted, I was reminded of that spirited passage in the Cid where the Cid's knight strikes in the Council one of the Counts of Carrion.

“Then arose the cry of Cabra,  
Here Valencia the fair,  
There Castille and here Galicia :  
Many a war cry rent the air.”

In something under an hour, however, terms were come to, and the coolies agreed to act, if firstly they were paid in advance, and secondly if the headman, in consideration of their acting in place of men he was bound to furnish, would present them with a fat sheep for dinner. Matters thus arranged, peace and good humour were restored, and the headman carried them all off to his house under pretext of hospitality, but also, I suspect, to guard against their changing their mind during the night. As I had already, in consideration of the hardship of the road, paid the coolies double the usual hire, I was somewhat at a loss to account for their unwillingness to earn an additional sum, and their preferring to return empty handed. As, however, I am not one of those ingenious theorists who solve such questions by supposing “niggers” act on principles unintelligible to other mortals, I made some enquiry and soon found a reasonable ground for their conduct. The coolies I found were furnished by the headman of Kiba who supplied them with food, but appropriated their wages himself. No wonder, therefore, the poor fellows objected to so much extra labour, from which they would reap small advantage. The traveller is powerless to remedy this, save by a small present which he may make to the men themselves, and in this case a few annas a piece, with the sheep they got at Korzo, made all happy and contented.

17th.—Return to former camping ground at the south end of lake.

On the march, it being a fine sunny day, captured a number of small lizards among the stony ground along the lake, *Phrynocephalus olivieri*, Dum. These animals associate together in pairs, as I usually took a male and female near each other, often under the same stone, under which when alarmed they would rush. They also form regular burrows in the ground, either under bushes or in the open plain, to a depth of 8 inches or a foot, according to the nature of the soil. The most curious point connected with these lizards is, that



they are viviporous, one female containing three foeti, though two seemed the commoner number. This departure from the plan of oviparous reproduction usual among lacertines seems intended to meet the exigencies of a severe climate, for in a region where snow sometimes falls at midsummer, eggs exposed in the usual manner would run considerable risk of having their vitality destroyed by an untoward frost. Those naturalists who adopt Darwin's theory of "natural selection," and the progressive mutation of species, will find it an interesting problem to explain (rejecting the old fashioned view of creative adaptation I have assumed above) how the oviparous progenitors in mythical times of these lizards came to adopt or acquire a viviporous organization, one problem of the many which the *new developement theory*, I should say "*Natural selection*" raises at every step. Near the camp the shores of the lake were perforated by the holes of a short-tailed rat or lemming, *Phaiomys leucurus*, Blyth. Their holes frequently were ranged in a long line against a bank and usually extended so far that all attempts to capture an animal by digging or flooding the holes with water proved fruitless. After infinite trouble, however, I managed to dig out an adult female, which on examination I found to contain six young ones the size of horse beans, three in each horn of the uterus. The total length of this specimen was 6.15 inches, of which the head was 1.30, and the tail 1.25. Colour yellowish mouse brown, merging into pale gray beneath. This colour, however, only extended to the tips of the hair, the body of each hair being dark slaty-blue only visible when the fur was thrown back; fur loose, length, three-eighths of an inch; whiskers, seven-eighths; ears rounded, medium size, rather oppressed. I subsequently got several more, mostly half-grown, by watching near their holes with a gun.

18th.—Camp a little below halting-place of the 15th.

19th, *Phalang-palra*.—A mere halting-place among loose rocks which afford shelter from the wind. A few miles from last night's camp recross the Para river, which here was in several channels, in two of which the water nearly reached to a man's hips.

20th, *Tatung*.—(Tratung Kongma of Cunningham). A mere halting-place close to the highest limit of furze on the west bank of the Para river, a little above where I halted on the 13th. Sleet fell dur-

ing the day, and the thermometer in my tent went down towards morning to 30°.

21st.—Recross the pass to camping ground in the Parilanghi river. Temperature of the air at the top of the pass 56°. Much fresh snow had fallen since first crossing it, the glare of which was very unpleasant.

22nd, *Kiba*.

23rd, *Chikim*.—Having procured fresh coolies, cross the stream separating Kiba from Chikim and devote a day to the examination of the neighbourhood. Chikim is situated in a broad valley partially cultivated and well watered. The barley crops are now either ripening or being gathered in; at Kiba they were still green in some places, but heavy in the ear.

24th, *Ki*, 12,500 ft.\*—Halt a day here to examine the neighbourhood. The monastery adjoining is one of the most picturesque buildings I have ever seen, or rather group of buildings, perched on the summit of an isolated peak a couple of hundred feet above the plain, and protected behind by a stupendous limestone cliff, some fourteen hundred feet high.

26th, *Kuling*.—Cross the Spiti river four miles below Ki, where the rocky chasm through which it rushes like an arrow, is spanned by a bridge formed of two trees, on which are laid wicker hurdles which, though rather shaky, will support a horse or yak.

27th, *Chang*, 11,568 ft.\*—A tedious march, road in parts very steep and bad. In the small stream flowing into the Spiti river below Kuling, found a species of *Limnæa* adhering beneath stones, the same as noticed at Danka; and near the camp, among river rejectamenta, a *pupa* and a couple of *helices*,\* small but very abundant. These are the only land mollusca noticed in the valley, but they were nowhere found in a living state. In a small feeder of the Spiti near the camp saw some small fish, long and eel-like, sheltering under stones, but could not capture any. Temperature of water 43°.

29th, *Mikim*, 11,762 ft.\* A rather pretty village situated on the west bank of the Pin river, a little better than eight miles from its mouth.

30th, *Muth*, 12,306 ft.\*—(*Mud* of Cunningham). Cross the Pin river a little below Mikim. Like all rivers flowing from glaciers, this

\* *Pupa muscorum*, *Helix fulva*, *H. pulchella*.



should be crossed early in the day, as in the afternoon the melting of the snow raises it to a dangerous height. I crossed on a pony about 8 A. M., and the water was then up to the coolies' hips, and so powerful the current that a single man could barely stem it; the plan adopted being for all to join hands and force their way over in a body. A gentleman who crossed the day before had been separated all night from his baggage, owing to the men delaying to cross with him and being subsequently prevented following by the rapid rise of the river as the day advanced;—an unpleasant accident to happen anywhere, but particularly unfortunate in such an inhospitable region as Spiti. At the village of Tiling, three miles from Muth, noticed a large number of Ibex horns, which I have nowhere else seen in the valley, "burrel" horns being those commonly met with. Camping ground on the opposite side of the stream from the village, opposite which there is a wretched suspension bridge.

31st, *Balair*, 13,225 ft.\*—A mere halting-place, eight miles from the crest of the Tári or Bába pass. Near Balair passed large flocks of sheep and goats driven up here for pasturage, which is very luxuriant. I purchased one very fine ram of the Hunia breed of sheep with a fine pair of horns for four rupees. It was amusing to see how he sent my men reeling like ninepins, when they attempted to separate him from his fellows; but when my sheep came up, he suffered himself to be led along with them easily enough. Notwithstanding his size and fine horns, he proved to be little more than four years old, if so much. As I only required his skull, I gave the body to the coolies, who were more pleased than if I had given them a sheep with greater pretensions to edibility. The blood was carefully collected and cooked into a sort of pudding, but the headman first dipped his fore finger into it whilst still reeking, and flipped a little into the air and over the stones three or four times, muttering a short prayer whilst doing so. This I presume was a sort of expiation, or lustration for the act of shedding blood, which is theoretically a crime according to Buddhist notions. Among the loose rocks round the camp, shot several specimens, with feet furred to the toes, of *Lagomys Roylei*, Ogilvie. Though not rare here, I saw none south of the pass, though the ground was very favorable for them; and I conclude they do not range south of the Spiti valley. In a stream crossed in this march, collected many *diatoms*.

*1st September, Camp, south of Bába pass 12,793 ft.\**

The ascent to the Bába pass is far from difficult, though a large glacier descends from the summit. This glacier is fissured by numerous crevasses stretching nearly across it, and at short intervals from one another. Few of these crevasses are so broad as to be impassable, but in order to select the best spots for crossing, the road winds considerably, and it would be decidedly difficult to cross without a guide who knew the track. The day before I crossed much new snow had fallen, which made the walking rather laborious and from its dazzling whiteness proved very annoying, though not to the extent to necessitate the use of a veil, though travellers would do well always to provide themselves with this article or a good pair of tinted spectacles or eyeshades.

On the southern descent of the pass a small glacier was crossed, but a very inconsiderable one compared with that to the north. The descent was extremely steep, far more so than on the opposite side, and soon brought me to the region of birches and verdure, the encamping ground being a rather straitened plot on the hill side covered with a rank crop of grass, wild flowers, and ferns.

*2nd, Camp on east bank of the Wangur river, at Umpti 9,317 ft.\*—* There is no village here, but a mere camping ground in a fine forest of pines. This day's march appeared much longer than the map shows it to have been. The whole of the Wangur valley is remarkably picturesque, the central portion being well wooded with pines, oaks, birches, &c., whilst on either side rise up steep mountains terminating in snowy peaks and glaciers, and in many places scarped into precipices of the grandest dimensions. One of these magnificent precipices opposite the camp exhibited a sheer wall of rock springing from the Wangur river to a perpendicular height of three thousand feet, unquestionably the most majestic scarp I have ever beheld.

*3rd, Wangtu Bridge.*—At the village of Yangpa, some few miles below camping place, changed my Pin coolies, who from this return to Muth. About Yangpa, apricot, peach and walnut trees were flourishing in abundance, and in front of a wooden temple two trees very like fine elms. Some way below Yangpa the Wangur river is crossed by a timber bridge, after which the road keeps along its west bank to Wangtu. This portion of the road is steep and difficult, ascending and descending most precipitous rocks and is quite impassable



for any quadruped larger than a goat. In one spot the road crosses a highly inclined slippery surface of gneiss, on which a footing is impossible, but small holes have been drilled at intervals in the rock in which one can place one's toes whilst others above support the fingers, and by their means a passage across is effected. Ascending this place is comparatively easy, but to descend requires some nerve, as in going down all the danger of the spot is clearly discerned, to say nothing of the greater actual difficulty of descending than ascending a difficult slippery incline, where a single slip is annihilation.

The last descent to Wangtu is excessively steep and difficult, from the precarious footpath being to a great extent concealed by long grass, which greatly impedes walking over such ground, and on this account some of my coolies did not reach Wangtu till after nightfall. Luckily met here a large company of grain merchants conveying wheat into the interior, from whom my coolies purchased some flour, of which their supply was completely exhausted; and there being no village here, I was at first sadly afraid, before meeting these men, that my coolies after their hard day's work would have had to pass the night supperless.

In the book at this bungalow I noticed several complaints from travellers regarding the difficulty of getting coolies and the impudence of the man who had to supply them. No doubt the charges were well founded, but there are some people who seem to suppose that all natives, official and others, should always bestir themselves with alacrity for the mere pleasure and glory of so doing, and my own experience goes to prove that in places where delay is to be anticipated from any cause, a small present coupled with a few civil words is all that is required to obtain anything that is obtainable. Men, accustomed to deal with European travellers along this road soon distinguish for whom they are working, and if they find the new arrival a close fisted individual, they are liable of course, naturally enough, not to exert themselves as they otherwise might. Travellers are too apt to forget, when they arrive perhaps in the middle of the day and want a fresh relay of coolies, that at such a time all the villagers around are scattered in the fields at work and cannot easily be gathered together. I myself experienced no difficulty or incivility at this bungalow, wherefore I have been induced to offer the above remarks.

4th, *Painda bungalow* 6,354 ft.\*—Made a forced march to this bungalow which is a comfortable one on the line of uncompleted new road, but not quite finished. Felt quite jolly at being once more under a comfortable roof, instead of a dripping tent.

5th, *Sáraon bungalow* 6,632 ft.\*—Made a forced march into Sáraon. In the woods near Sáraon hazel nuts were plentiful, and many of them ripe and falling from the trees.

I put up for the night in a large well built room, probably intended for labourers employed on the bridge or road, the only drawback being a few fleas which occupy such situations. The building stands in what evidently once formed the gorge of the Sutlej, before the river had cut its present deep channel a little to the north; though during floods possibly the superfluous waters may still find an exit down this channel. At present, however, it is used as a camping ground for the flocks of sheep which convey grain into the interior, and the whole is clothed with a thick crop of "Batu" dropped by passing grain merchants or travellers, and which flourishes luxuriantly in this moist well manured spot. After my hard march I slept soundly, aided perhaps by the subdued murmurs which reverberated among the rocks from the surging river below.

4th, *Painda bungalow*, 6,354 ft.\*—Before breakfast strolled out and shot several blue pigeons which abound on the precipitous rocks which line the Sutlej here. Large lizards, (*laudakia melanura*?) also abound among the rocks, to the crevices of which they retreat when frightened. They seem to attain their largest size at a height of 4000 or 5000 ft., occurring much smaller at Simla than at lower elevations along the road. Their abdominal cavity usually contains a great number of entozoa lying freely among the viscera, probably the undeveloped or couchant stage of some tænia, whose perfect form must be sought for in the viscera of some carnivorous bird or mammal.

6th, *Dhurni bungalow*, 9,275 ft.\*—This bungalow is situated on the crest of a ridge, and the road is carried over a very sharp ascent, with little attempt to preserve a uniform gradient. In the village just below walnuts were being gathered and peaches covered the trees in profusion, but mostly small and unripe. *Limax altivagus*, *mihi*, was also common in the early morning, its traces being numerous, though I noticed none of the animals during the day.

In front of the bungalow was a large piece of ground under pota-



toe cultivation, of which long untasted vegetable I made free to dig up a few pounds. This must be near the highest limit at which they will thrive, and they certainly could not compare with the potatoes of Kursiang (Darjiling) or Cherra, though it was too early to obtain them of their full size. I do not know if the seed potatoes are cut up in the hills or planted whole, as is invariably the case in the plains, a plan which would account for the smallness of the tubers, independently of other causes affecting the plant.

*7th, Nogri bungalow, 4,355 ft.\**—Road descends sharply to a feeder of the Sutlej, on the banks of which the bungalow is situated in a narrow picturesque valley, but not, I should be afraid, above the region of malaria. On the way down witnessed the rude way in which sheep are sometimes shorn here. The unfortunate animal I saw, when being operated on, was firmly secured on his side by a rope round his horns, the other end of which was secured to a peg driven into the ground, his hind legs were in like manner pulled out taught, and fastened to another peg, so as to prevent much flinching, whilst his owner was leisurely carving off his wool in short strips by means of a small cheese knife, or a knife of precisely that shape. Up the valley chakor were numerous, but I saw no other game.

*8th, Bowli bungalow, 7,709 ft.\**—A steep ascent to the bungalow, which is situated on the ridge opposite to that on which Dhurni bungalow is built. This bungalow has an evil repute for fleas, but seemed to have just been cleaned when I used it, and I was not consequently troubled with bed-fellows.

*9th, Sungri bungalow, 8,356 ft.\**—An extremely good and pretty road, rising slightly to the bungalow. In the morning was awakened by the noise made by the koklas pheasants in the brushwood close by; but so thick was the vegetation that I could not catch a glimpse of a bird. Monal are also common about here, and I purchased a couple of fine skins well prepared by a shikaree.

*10th, Bághi bungalow, 8,591 ft.\**—Two short stages, amounting to about sixteen miles, passing the Kandála bungalow half way; road excellent and country open and rather pretty. Noticed a swarm of wild bees in a hole in a clay bank, or rather beside a large block of stone embedded in the bank, but only a small chink for entrance. Such a situation is I suspect unusual, and strange to say I have noticed no wild bees' combs on the rocks adjoining the Sutlej, though

they would certainly be found in such spots in the plains. I once, however, found near the Son a small comb on the under surface of a stone little more than a foot square, which was propped up against another resting on the ground and exposed to be trodden on by men or animals. The only place where I noticed tame bees was a village below Yangpa, in which a large well built house contained an immense number of hives ranged in the walls, small openings being made for their entrance in the timbers of which the house was partially constructed. This house must have contained close on fifty hives. The owner being absent, I could neither taste the honey nor ascertain the mode of hiving the bees, but it is probably similar to that practised in Kashmir, where it is a very usual thing for a house to have a dozen hives in the wall, each consisting of an earthen pot or cylinder contained in a small chamber in the wall with but a small external opening for the egress of the bees, but closed internally by a cover luted on, through which the honey is removed after the bees are stupified by smoke.

11th, *Narkanda bungalow.*

12th, *Matiana bungalow.*

13th, *Fágu bungalow.*

14th, *Simla (Hawthorne cottage (6,579 ft., mean of 5 Obs.)*—The most remarkable feature of interest I noticed on my return was the appearance presented by the cedars. On quitting Simla, the most conspicuous cones were those on the female trees, of a large size and a bright apple green, but now the male trees were covered with great numbers of small cones not a fifth of the dimensions of the others, but prominent from their immense numbers on the trees, and the copious clouds of pollen that they were discharging. The advent of autumn was also marked by the absence of numerous familiar flowers and ferns, fit and beautiful emblems of man and his short-lived destiny.

“Οἷη περ φύλλων γενεὴ τοίῃ δέ καὶ ἀνδρῶν·

Φύλλα τὰ μὲν τ' ἄνεμος χαμάδις χέει, ἄλλα δὲ θ' ὕλη

Τηλεθόωσα φύει ἔαρος δ' ἐπιγίγνεται ὥρη·

Ως ἀνδρῶν γενεή, ἣ μὲν φύει ἣ δ' ἀπολήγει.”—Hom. Il. VI.

Which same idea Crabbe thus paraphrases and enlarges in his Parish Register :

“Yes, he is gone, and we are going all,

Like flowers we wither and like leaves we fall.



Here with an infant joyful sponsors come,  
 Then bear the new-made Christian to its home ;  
 A few short years, and we behold him stand  
 To ask a blessing with his bride in hand ;  
 A few still, seeming shorter, and we hear  
 His widow weeping over her husband's bier ;  
 Thus, as the months succeed, shall infants take  
 Their names, while parents them and us forsake ;  
 Thus brides again and bridegrooms blithe shall kneel  
 By love or law compelled their vows to seal ;  
 Ere I again or one like me explore  
 These simple annals of the village poor."

On the whole, though reaching Simla proved a grateful change to the hard fare and vicissitudes of hill travelling, I did not now experience the same buoyant feelings of pleasure as on my first visit in early summer, and it was with less regret, therefore, that I commenced immediate preparations for quitting pleasant friends and a fine climate and once more devoting myself to routine pursuits in the plains.

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NOTICES OF WORKS CONNECTED WITH SANSKRIT LITERATURE.

*The Bháminí Vilása of Paṇḍitarāja Jagannátha, edited by Paṇḍit Jadu Náth Tarkaratna.*

Calcutta, 1862.

This is an edition of one of the modern Sanskrit poets, whose works are very scarce and consequently but little known. Like the modern Latin poets of Europe, Paṇḍitarāja Jagannáth has but a reflected beauty,—he feels only at second hand ; still he has considerable elegance of style and occasionally even some originality of thought. Dr. Aufrecht, in his Catalogue, would fix his date as late as the emperor Akber, but we know not on what grounds. The only personal allusion in the poems themselves is in the last stanza but one.

" I have read all the Sástras and performed all the necessary rites, and my early days were spent under the branch of the hand of Dehli's lord, but now I have changed my dwelling place and worship Hari in Mathurá ; I have achieved all superhuman tasks, the ornament of the assembly of pre-eminent paṇḍits."

The work has been edited from some MSS in the Asiatic Society's Library and that of the Sanskrit College. It consists of four sections ; the first contains a number of allegorical stanzas on various moral subjects, the second a series of amatory commonplaces, the third an elegy on the death of a wife,\* and the fourth a number of stanzas in praise of Kṛishna and final liberation. The editor has added a useful commentary to explain any obscure allusions or unusual words—the latter being not unfrequent.† The first book is much the most interesting, and some of the verses might remind one of the later epigrams of the Greek Anthology. We subjoin two as specimens.

“ When I am dry, and overhead the summer's fiercest splendours burn,  
To whom for succour in the drought will the faint troops of travellers turn ?”  
To whom indeed ? Oh generous lake beside the highway, on thee be  
My choicest blessing, but my curse upon the salt and niggard sea.‡

The next re-echoes something of the bitter experience in Dante's lines, “ tu proverai,” &c., or Johnson's “ the patron and the jail.”

Unforced to watch another's door, and sue in vain with suppliant knees  
To win a patron's churlish dole,—merrily live the jocund trees !§

E. B. C.

\* This elegy was printed by Böhlen as an appendix to his edition of the *Ritusanhāra*.

† Some, as the frequent मिलिन्द, ‘ a bee,’ are, we believe, not found in any dictionary.

‡ याते मय्यचिरान्निदाघमिहिरज्वालाशतैः शुष्कताम्  
गन्ता कं प्रति पान्यसन्तिरसौ सन्तापमालाकुला ।  
एवं यस्य निरन्तराधिपटलैर्नित्यं वपुः क्षीयते  
धन्यं जीवनस्य मार्गसरसो धिग् वारिधीनां जनुः ॥  
§ परोपसर्पणानन्तचिन्तानलशिखाशतैः ।  
अचुम्बितान्तःकरणाः साधु जीवन्ति पादपाः ॥





LITERARY INTELLIGENCE, CORRESPONDENCE, &c.

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Dr. Sprenger writes in a letter to the President, dated Wabern, 1st October, 1862.

“The Philologen Versammlung at Augsburg was again well attended, particularly by Vienna Orientalists; I had expected Raverty would come, and was disappointed not to find him there. Some interesting papers were read, on Himyaritic and Sinaitic Inscriptions, on the present state of Turkey, on Egyptian Archæology, on Babylonian Antiquities, &c. These meetings are rather riotous, and for this reason, fatiguing, but very useful for restoring the harmony which literary quarrels have disturbed in the course of the year.

“I wish Mr. Thomas might succeed in obtaining the *Tabakáti Násiry* from Lady Elliot. It is a very important book. Should you not succeed and feel inclined to publish a Persian text, you might choose extracts from *Ways wa Rámyn*, of which the only copy known to me is in your Library. On this interesting work see Ouseley, p. 45, Hajy Khalyfu, No. 14318, and my Catalogue of Oudh, p. 338. As your MS. is defective, you cannot give the whole work, nor is it desirable, but you could fill two fasciculi with extracts.

“I am just now engaged in collecting notes on the history of Geography among the Arabs. Dr. Peschel, the Editor of the *Ausland*, prepares a work on the History of Geography for the press, and the portion of his labour which refers to the knowledge of the Arabs of the Southern Seas, he intends to write in the form of letters addressed to your servant with a view that I might add notes. This proceeding appears to me rather cruel towards me, inasmuch as I should be obliged to enter deeply into a subject on which we shall probably never come to clear results; I therefore prefer to send him as many notices as I can find, and to leave him the responsibility of the use he may make of them, and the conclusions he may draw from them.

“Of literary news I only heard that Wüstenfeld, who intends publishing the large Geograph. Dict. of Yaqut, finds great difficulties in establishing a good text for want of good MSS. When I left India, I

was told a copy was for sale at Lucknow. I tried in vain to get hold of it. If it is to be found it would be worth while to purchase it (the price then named was 100 rupees) and to send it to Wüstenfeld, who, if the opportunity was offered to him, would no doubt be glad to buy it himself.

“Mr. De Goeje of Leiden is preparing an edition of the Geography of Abu Zayd Balkhy and of that of Ibn Hauqal. He farther intends to edit the *Asás albilágha* أساس البلاغة of Zamakhsháry. The latter work I consider as useless, or rather worse than useless, but the former two will be a very useful addition not only to eastern geography, but also to our knowledge of the state of civilization of the empire of the Khalifs.

“Should you not like to undertake a poetical work in Persian, I would recommend you the *Ayeen Akbaree*. It is one of the most valuable historical records we possess. I am aware of the difficulties which will attend the editing it. There is probably not one copy to be found which contains all the tables. Your best plan will be to collect all the MSS. you can find, to collate them and to make a new copy, as perfect as your materials will allow, with all the variants of importance, and if you are unable to give a perfect text, to restore it as far as it is in your power,—you might possibly get MSS. from the India House. If not, I dare say Mr. Wright would compare your MS. with those found in England. Sir H. Elliot had the intention of translating it, and he prepared a copy for this purpose. Mr. Thomas might possibly get it for the sake of its being compared. Whatever the result of your endeavours may be, thus much is certain, no one will be able to do as much as your Society.”

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Capt. E. Smyth writes from Camp Srinugur, Gurhwal, November 20th, 1862.

“I crossed the Niti pass into Gurhwal on the 21st October. It was tolerably cold before I left, but not so cold as last year. One day the thermometer was at 8° at sunset and the same next morning. (It probably went down to zero during the night.) Last year it sank below zero on several occasions. I crossed the Johar pass into Thibet on the 15th September. I was benighted and had to bivouac without



tent or fire-wood near the top of the pass. When I awoke next morning at two, I found myself covered with snow, as it had snowed all night, but I did not feel the cold in the slightest, being wrapped in a suit of Canadian furs I had sent to me from England. I met about twenty Tartars at the foot of the pass on the Thibet side. I had made no secret of my intention of going from here forty or fifty miles eastward to our district of Byause, then re-crossing the Byause pass into Thibet and going eighty miles westward through Thibet to the Niti pass. These Tartars had accordingly been sent to stop me, so next day, I halted and shot four fat burral, and gave them one. When they had eaten it, I sent for them, and after a good deal of talking and tobacco smoking I had it all arranged to my satisfaction. I could have forced them easily enough, but it was better policy to manage the thing peaceably. At Byause, I received your last letter containing a list of desiderata for the museum from Mr. Blyth. I have had very little sporting since I received your note, but I have managed to procure a few of the things mentioned in the list, and will send them on my arrival at Almorah after the Bagesur fair in January, and I will at the same time send your birds, and as many more as I can procure between now and then.

From Niti I crossed a very high and seldom used pass between Niti and Budrinath. It is about 18,000 feet and being within reach of the rainy season, there is much more snow and glacier than on the passes leading into Thibet. We mistook our way and had to bivouac on some rocks close to the top of the pass without food, water or fire-wood, and where there was not room to lie down, on the face of a sheer precipice. Here we had to remain squatted until 10 A. M. next day when the sun made its appearance, as the rocks were too cold to touch with our hands. The thermometer all night and until 10 A. M. next day remained at 10°. I had only two loads with me. I did not feel the cold at all, and slept all night in a sitting posture, but all the men with me I am sorry to say suffered. Some were sick all night, and three men had their feet frost-bitten more or less, only one at all severely. This was on 1st November, which is very late for crossing a high glacier pass. No European had ever crossed the pass before.

If the Government allow Stewart and me to go, I will send you a sketch of the plan by which I propose to reach Lhasa. We may per-

haps fail, but if we do, no harm will be done, and we can then return to our appointments.

I do not remember whether I have ever told you that an immense quantity of the villainous stuff called brick tea is sent from Lhasa to the Gurtokh authorities, which is forcibly sold to the people, who are obliged to take much more even than they can consume themselves; and our Bhootiah traders find that they are obliged to take the surplus in exchange for their wares.

Until this system is stopped, there will be never any great demand for our hill tea.

This should be one of our objects if we go to Lhasa."

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The following is a communication from E. Thomas, Esq. to the President, dated London, 28th December, 1862.

I send you by this mail an elaborate facsimile of the Taxila Inscription, alluded to in my note p. 108, Journal R. A. S. Vol. XX. a copy of which is enclosed.\*

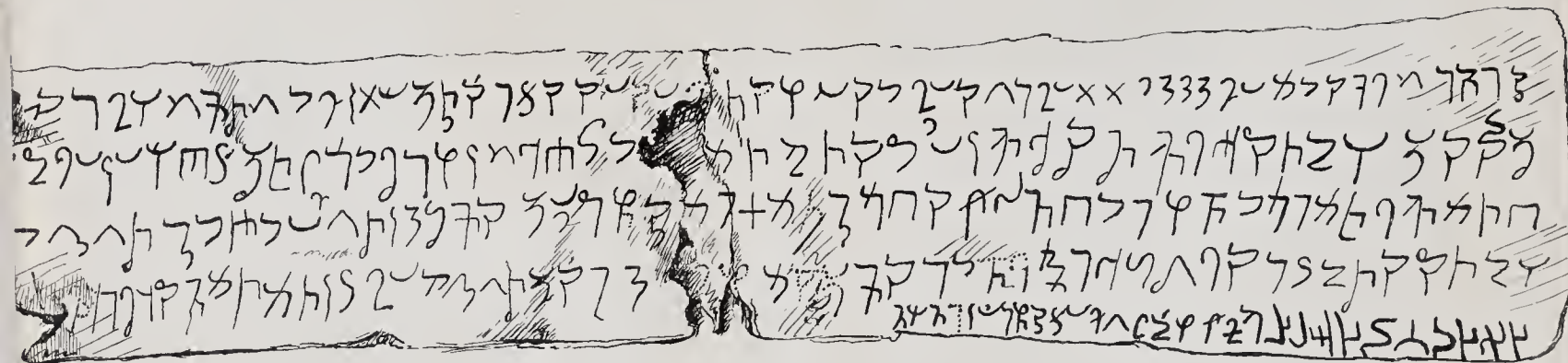
I think you may rely upon this as a faithful copy† and accept it as fit to be placed, at once, in the hands of your lithographer. The pencil lines, over which I have written in ink, formed the original transcript from the copper plate, made, through the medium of a

\* "Professor Dowson has succeeded in mastering the inscription on a steatite funereal vase, preserved in the Pesháwur Museum, which proves to refer to the erection of a *tope* by the Brothers Gihilena and Siha-rachhitena. And finally Mr. Norris, in concert with Mr. Dowson, is engaged on a most promising inscription from the neighbourhood of Hussun Abdal, near Ráwul Pindee, in the Punjáb, presented to the R. A. S. by A. A. Roberts, Esq., C. S. regarding which, Professor Dowson has obligingly communicated to me the following notice: "The plate, which is fourteen inches long by three and a half broad, is broken in the middle, where many of the letters are lost; a connected reading of the whole cannot, therefore, be hoped for. The King's name is *Chhtrapa Siliako Kusuluko*; these words are followed by *nama*, so there can be no doubt that they form the name. After the name there are some letters obliterated, and then follow the words *Takhasilaye nagare utarena prachu deso*, which probably mean "the country north-east of Taxila." The words *Chhatrapa liako* are stamped as an endorsement on the back of the plate." I myself have not had an opportunity of examining this inscription, but I should be inclined, as a first conjecture, to identify the *Kusuluko* with some of the Kozola Kadapes family. The figured date on the plate is  $\times \times ^2 333$ , which is followed by the words *Maharaysa maháta*, &c. (Prinsep's Essays ii. 202, 203.)"

† The words *Patipasa Chatra pa Liako* are reversed in the plate as they are in the original, being indorsed on the back of the plate and shewing through reversed.



M<sup>r</sup>. A.A. Roberts' (Taxila) Plate.



LITHOG. BY H. M. SMITH, SURV. GENL'S OFFICE, CALCUTTA, FEB. 1863.





Camera lucida, by that excellent artist, Mr. Ford, as a basis for the engraving, which is designed for the pages of the forthcoming number of our home Journal. I myself have tested every letter of the Inscription and added many that were wholly illegible when the relic was first discovered.

My object in forwarding this most interesting record is, that it may be submitted to the Antiquarians in your Presidency, with a view to an independent translation being made, prior to the receipt of Professor Dowson's rendering of the text, which will probably not be published much within a month from this date. With this object of testing oriental scholarship, I abstain from all comments on the many important bearings of the document itself, though I feel bound to anticipate Professor Dowson's own announcement of his successful discovery of the value of the numerals composing the date, which even the last number of your Journal (III. 1862, p. 303) shows to be far from accomplishment by your local contributors. I must premise in order to dispel any doubts about the positive accuracy of the present interpretation, that Mr. Norris independently worked out precisely the same result on the problem involved in this inscription being submitted to him. In brief, then, the numerals employed in Arian or Bactro-Pálí Inscriptions follow an Egyptian system. Units are found to run  $I = 1$ ,  $II = 2$ ,  $III = 3$ , but the 4, unlike the Kapurdigiri example of  $IIII$ , is now formed by a cross, similar to a Roman  $\times$ , a symbol, it is true, we do not find in any Egyptian Hieroglyphic scheme, though the five-pointed star exceptionally denoted 5. It will be seen that the Arian *eight* is formed by a duplication of the *four* in this fashion  $\times\times$ .

The ten is represented by a semi-circle, and, in its system of duplication, triplication, &c., proves in like manner to take after the usage of the Egyptians; though it is unquestionable that one of the less common forms of the Phœnician *ten* is expressed thus  $\gamma$  (Gesenius p. 87), yet, to my understanding, the whole scheme seems to be based more directly upon the purely Egyptian ideal,\* than upon any

\* Hieroglyphic Numbers p. 402. Encyclop. Metr. by R. S. Poole, Esq. and *Rèvue Archéologique*, p. 261, November 1862.

One  $\bigcirc$  or 1

Two  $\bigcirc\bigcirc$  or 11

derivative altered and elaborated through Phœnician influences, such as might have been anticipated to have accompanied the apparent course of the Arian letters themselves. This may be a curious question for future investigation and illustration; at present, it is sufficient to say, that the three Arian figures, similar to our English 3, constitute as a total, the sum of *six tens*, while the isolated 7, at the end of the row of figures, completes the number of 70, to which we have to add the eight, already noticed under the units—making the complete date of the plate the year 78.

In conclusion I may notice, that Mr. Dowson concurs in Colonel Cunningham's reading of the Macedonian months!

Four 0 0 0 0

Ten 11.11 — 11.11

These are run either 11 11 11 11 thus for 40 or thus for

$$\left. \begin{array}{c} 11 \ 11 \ 11 \\ 11 \ 11 \ 11 \end{array} \right\} 60$$

$$\left. \begin{array}{c} 11 \ 11 \ 11 \ 11 \\ 11 \end{array} \right\} = 42$$

100 = 11

Gesenius p. 87 Phœnician Numbers; ordinary 10 is — but, *alia figura itidem denarium numerum designans est hæc semilunaris* 11 11 11

See also Juda's "La langue Phénicienne," p. 84.





PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,

FOR NOVEMBER, 1862.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on the 5th instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed.

Presentations were received—

1. From Lieut.-Col. J. P. Beadle through E. C. Bayley, Esq., a set of the photographs of Buildings, Monoliths, &c. in Orissa taken by the Government Photographer in Cuttack.

2. From C. A. Elliott, Esq., a copy of his work entitled—The Chronicles of Oonao, a district in Oudh.

3. From the Academy of Sciences, Hungary, several publications of the Academy.

The Council reported that they had appointed Dr. J. Fayrer to be a member of the Committee of Finance *vice* Dr. Crozier, who has gone to England.

The undermentioned gentleman was named for ballot at the next meeting :

S. Lobb, Esq., M. A. of the Presidency College, proposed by Mr. Cowell and seconded by Mr. Atkinson.

With reference to a recommendation of the Council that Mr. E. Thomas be appointed Honorary Agent of the Society in place of the late Professor H. H. Wilson, the President stated as follows :—

“The Council have asked me to obtain the assent of the Meeting to their proposition to appoint Mr. E. Thomas to be their Honorary Agent in London. I need not explain that Mr. Thomas is an old and

distinguished member of our Society, for it was only last year that the Society signified their appreciation of his reputation as a scholar and numismatist by electing him one of their Honorary members. In a recent letter I had asked him if he had any objections to my proposing to the Council his appointment as the successor of the late H. H. Wilson, and he has in reply readily assented. The post is one in which he will be in a position to be frequently of great service to us in England, and which I think it is for the interest of the Society to keep always filled. Its first incumbent, if I mistake not, was Colebrooke, who retired from it, and indeed from all literary life, under pressure of ill health in 1830. The next was H. H. Wilson, to whose active co-operation we are perhaps mainly indebted for the annual grant which was made to us more than twenty years ago by the home authorities. In now appointing Mr. Thomas, the Society will secure for itself the services of an Agent not less distinguished in his own special line of study than were Colebrooke and Wilson in theirs."

The Meeting unanimously adopted the Council's recommendation. Communications were received—

1. From the Under-Secretary to the Government of India a memorandum received from the Bombay Government regarding Captain Speke's expedition to Eastern Africa.

The Secretary read the following extracts from the memorandum.

Writing from Kazeh on the 24th January, 1861, Captain Speke anticipated that he would be prepared to set out in a few days to explore the Northern countries, and investigate the Victoria Nyanza with the view of determining whether or not the lake was the source of the Nile, and of following down any affluents until he arrived in Egypt. Should unforeseen obstacles arise he intended to endeavour to cross the Northern extremities of the Nyanza and reach Zanzibar.

The expedition would attempt to reach the navigable Nile, the passage to Egypt appearing, from all the information which could be collected, the more easy and economical one, and the more advantageous for the future opening of the country, and this plan would only be relinquished in the event of Mr. Petherick or any other traveller arriving at Uganda by the passage of the Nile before him.

Captain Speke, and his companion, Captain Grant, had been most hospitably received at Kazeh by Sheikh Moosa M'zari [a native of Surat] a trusted friend of the former expedition. The Sheikh actively



assisted in procuring porters, and he generously gave the expedition the services of all his servants, and with this aid Captain Speke was enabled to advance. The Sheikh would travel in company with the expedition as far as Uganda.

2. From Babu Gopi Nath Sen, Abstract of Meteorological Observations taken at the Surveyor General's Office in August last.

3. From E. Blyth, Esq., a memoir on the Rats and Mice of India.

4. From Sir Robert H. Schomburgk, a paper containing an account of a visit to Xiengmai the principal city of the Laos or Shan States.

The Secretary read the paper. It will be printed in the Journal.

Major Walker read some selections from the last report to Government, on the operations of the Trigonometrical Survey, which was submitted at the last meeting and which will be published in a forthcoming number of the Journal.

He then said that he was glad to avail himself of the recent publication of the fourth, and last, of Archdeacon Pratt's papers on the effect of Local Attraction on the operations of the Trigonometrical Survey to acknowledge the obligations of the survey to Mr. Pratt, for his theoretical investigations of this very abstruse and difficult subject. There was a time when the subject seemed likely to become one of the numerous *vexatæ quæstiones* of science. Before Mr. Pratt commenced his investigations, attempts had been made to prove that the influence of Himalayan attraction had been overlooked by Colonel Everest, and that it exists to an extent which would seriously impair the value of the Indian arc, in determining the figure of the earth. But Colonel Everest had paid considerable attention to the influence of mountain attraction in deflecting the plumb line. He had rejected one of Colonel Lambton's astronomical stations in the Madras Presidency, because of its proximity to mountains. During a visit to the Cape of Good Hope he wrote a very able paper, which attracted much attention in the scientific world, on the effects of the attraction of certain mountains, in the vicinity of the extremities of LaCaillies's arc, near Cape Town. The difference between the ellipticity of this arc, and of those measured in Europe and Russia, was sufficient to give rise to the conjecture that the figures of the Northern and Southern hemispheres were considerably different. But Colonel Everest shewed clearly that the discrepancy was probably caused by the proximity of mountains to the ends of the arc. He suggested its

extension to points where there would probably be no attraction, and he predicted that it would then give a figure coinciding with those obtained in Europe. These suggestions have been entirely verified by the subsequent remeasurement and prolongation of LaCaillies's arc by Sir Thomas MacClear, the Government Astronomer at the Cape.

Major Walker mentioned these circumstances to shew that the officers entrusted with the survey of India had not been blindly ignoring the influence of mountain attraction.

It was believed to have been avoided, in great measure, by placing the northern extremity of the arc at Kaliana, a distance of upwards of sixty miles from the Himalayas. Colonel Everest considered that the residual errors were about  $5'\frac{1}{4}$  in the northern section of the arc and  $3''\frac{3}{4}$  in the southern section, by which amounts he conceived the astronomical amplitude to be less than the geodesic in the upper section, and greater in the lower.

Major Walker observed that Archdeacon Pratt's early investigations shew that the Himalayas may have a far greater effect in disturbing the plumb-line than had formerly been supposed, thus raising a doubt of the scientific accuracy of the survey operations and questioning the correctness of the relative situations of places, as given in the maps. But the Archdeacon's last paper has dispelled this doubt, by proving the following elegant theorem that the length of an actual arc, measured on the surface of the earth, however altered its form may be by geological changes, is nevertheless sensibly equal to what would have been obtained had the original curvature been undisturbed; or, in other words that no possible change of curvature can disturb the normal length of the arc. Hence the relative mapping of a country is free from all error arising from local attraction. If the positions on the map are too far north or south, they will all be so to an equal degree, and consequently are relatively accurate.

The Archdeacon's investigations are further useful in establishing the fact that while the positive attraction of the Himalayas draws the plummet northwards, the negative attraction of the Indian Ocean has a similar effect. Thus, in moving from Cape Comorin to the Himalayas, the influence of the ocean diminishes, while that of the Hills increases, and hence there is a tendency to equalize the resultant attraction, at every point between the ocean, and the Himalayas. Major



Walker observed that the Archdeacon had thus rendered a second service to the survey by demonstrating the presence of an additional, but beneficial source of disturbance, tending to counteract the errors which the Himalayas acting above, would introduce into the astronomical arcs.

A vote of thanks was accorded to Major Walker for his valuable communication.

Archdeacon Pratt, who was present, said that it was gratifying to him to learn from so high an authority as the Superintendent of the Great Trigonometrical Survey himself that his investigations were considered useful. His connection with this subject had arisen from the accidental circumstance of his visiting Budraj near Dehra, ten years ago when on a tour of official duty, on which occasion Sir Andrew Waugh called his attention to the discrepancy which his predecessor had found to exist between the measured and observed lengths of the northern portions of the great arc of meridian, and asked him to turn his thoughts to the subject. The investigation is so difficult and abstruse that those only who had read his papers through would enter into it. To this he would attribute the impression which had gone abroad in some places that in his fourth and last paper in the Royal Society's Transactions he had in a measure receded from a position he had taken up in an earlier stage of the investigation; which was not at all the case. There could be no question that the deflection caused by the Himalayas at the northern extremity of the great arc is very great, about five times as great as that caused at Col. Lambton's station, which was rejected in consequence of the amount, as Major Walker has stated; and that there is a considerable deflection also at the southern extremity of the arc, arising from a cause which had never before been thought of, *viz.*, the deficiency of attracting matter in the ocean, and amounting, there was little doubt, to as much as four times the error at the rejected station. At intermediate places on the arc the effects were intermediate also. The tendency of the two causes taken together was, therefore, as Major Walker had stated to a certain degree to equalize the total error throughout the arc, that is in fact to conceal it, because the Survey brings to light only relative errors of deflection. His last paper had demonstrated by means of the theorem to which Major Walker had referred, that (inappreciably small quantities being

neglected) the distances between places determined by the survey are free from the effects of these errors of local attraction, and that a comparison of these measured distances with the latitudes found by observations of the heavens gave the correct amount by which the total local attraction (arising from whatever causes, mountains, ocean, or variations of density in the strata below) differed in passing from one place to another. It was to his having arrived at his satisfactory conclusion, that he attributed the impression which had existed in some quarters, that he had receded from some former position he had taken up. But he would add, that this result, which was so satisfactory as regarded the survey, could not have been anticipated, and could be known only by demonstration, when once the existence of the great disturbing causes he has alluded to had been brought to light. The total error by which the whole map was out of place on the terrestrial spheroid was still an unknown quantity, and was very probably as much as half a mile. The exact amount would always remain unknown, since although the effect of the Himalayas and of the ocean might be estimated in the way his papers had set forth, the effect of unknown variations of density in the strata below could not be ascertained.

The Librarian then submitted the usual monthly report.

#### LIBRARY.

The following is a list of the additions made to the Library since the last meeting.

#### *Presented.*

The Chronicles of Oonao, a district in Oudh, By C. A. Elliott, Esq.—BY THE AUTHOR.

Indische Studien, Vol. 5, Parts 2 and 3.—BY DR. WEBER.

Annals of Indian Administration, Vol. VI. Part 3 for September 1862.—BY THE BENGAL GOVERNMENT.

Bij dragen Tot de Taal-Land en Velkenkunde van Nederlandsch Indie, Part 4.—BY THE AMSTERDAM INSTITUTION.

Calcutta Christian Observer for October and November 1862.—BY THE EDITORS.

Paspati, A. G. Memoir on the language of the Gypsies.—BY THE AUTHOR.

General Report on Public Instruction in the Lower Provinces of



the Bengal Presidency for 1860-61.—BY THE DIRECTOR OF PUBLIC INSTRUCTION.

Journal of the Statistical Society of London, Vol. XX. V. Part 3 for September 1862.—BY THE SOCIETY.

Ditto *Asiatique*, Tome XIX. Nos. 75, 76 and 77 for June and July 1862.—BY THE PARIS ASIATIC SOCIETY.

Ditto of the Chemical Society, Vol. XV. Nos. 7 to 9 for July to September 1862.—BY THE SOCIETY.

Ditto of the Agricultural and Horticultural Society of India, Vol. XII. Part 3.—BY THE SOCIETY.

Ditto of the Sacred Literature and Biblical Record, Vol. II. No. 3 for October 1862.—BY THE EDITORS.

Ditto of the Royal Geographical Society, Vol. XXXI.—BY THE SOCIETY.

Memoirs of the Geological Survey of India, *Palæontologia Indica*, Vol. II. Part 3.—BY THE SUPERINTENDENT OF THE SURVEY.

Oriental Baptist, for August and September 1862.—BY THE EDITOR.

Oriental Christian Spectator for July and August.—BY THE EDITOR.

Proceedings of the Royal Geographical Society, Vol. VI. Nos. 3 and 4.—BY THE SOCIETY.

Ditto of the Royal Society of London, Vol. XII. Nos. 50 and 51.—BY THE SOCIETY.

Quarterly Journal of the Geological Society of London, Vol. XVII. No. 71 for August 1862.—BY THE SOCIETY.

Annual Report on the Administration of the Coorg Districts for 1861-62.—BY THE BENGAL GOVERNMENT.

Annual Report on the Administration of British Burmah for 1861-62.—BY THE BENGAL GOVERNMENT.

Annual Report on the Administration of Mysore for 1861-62.—BY THE BENGAL GOVERNMENT.

Report on the Administration of the Madras Presidency for 1861-62.—BY THE BENGAL GOVERNMENT.

Selections from the records of the Bombay Government, No. 65.—FROM PUBLIC WORKS DEPARTMENT.

Veni Samhara, a drama by Bhatta Náráyana.—BY MUKTARAMA VIDYABÁGIS'A.—BY BABOO P. C. TAGORE.

Zeitschrift der Deutschen Morgenländischen Gesellschaft, Vol. XVI. Part 4.—BY THE SOCIETY.

Prayer of St. Niersis Clayensis, translated into Bengali and Sanscrit.—BY BABU RAJENDRALALA MITRA.

*Exchanged.*

Athenæum for July, August and September.

The Philosophical Magazine, Vol. XXIV. Nos. 159, 160 and 161.

*Purchased.*

The Annals and Magazine of Natural History for August, September and October, 1862.

Abhandlungen für die Kunde des Morgenlandes—Kathá Sarit Sâgara, Vol. II. Part 5.

Abhandlungen für die Kunde des Morgenlandes Die grammatischen Schulen der Araber, Vol. II. No. 4.

Hewitson's Exotic Butterflies, being illustrations of new species, Part 44, 1862.

Journal des Savants for July, August and September, 1862.

Markham's Life of Donalonsq de Guzman.

Major on the Discovery of Australia by the Portuguese in 1601.

Numismatic Chronicle and Journal of the Numismatic Society for September, No. 7 of New Series.

Parthenon, Vol. I. Nos. 12 to 24, 1862.

Schleicher compendium der Vergleichenden grammatic der Indogermanischen Sprachen, Part 2.

Sprenger das Leben und die Lehe des Mohammad, Part 2.

Tornberg Symbolæ ad Rem Numariam Mohammedanorum, Part 4.

Revue et Magasin de Zoologie Nos. 6, 7 and 8.

Revue des Deux Mondes, from July to October, 1862.

Westminster Review for October, 1862.

Weils Geschichte, Vol. II.

Comptes Rendus, Vol. LV. Nos. 1 to 11, 1862.

Natural History Review for October, 1862.

Zenker Dictionnaire Turc-Arabe-Persan.

Benfey's Orient und occident, Vol II. Part 1.

Scheref Namah, Vol. II.

Wright's Arabic Grammar, Vol. II.



## FOR DECEMBER, 1862.

The Monthly General Meeting of the Asiatic Society was held on the 3rd instant.

A. Grote, Esq., President, in the chair.

The proceedings of the last meeting were read and confirmed. Presentations were received—

1. From the Secretary of the Government of India, Military Department, a set of photographs and notes descriptive of the tribes of Berar.

2. From the Under-Secretary to the Government of Bengal, a complete set of photographs prepared under orders of the Bengal Government for the London Exhibition.

3. From Dr. A. G. Paspatis of Constantinople, through M. J. P. Sagraudi, a copy of his work containing a “Memoir on the Language of the Gypsies.”

4. From Baboo Prosunno Coomar Tagore a copy of Pundit Muktaráma Vidyábagísa's edition of the *Vení Samhára Náatak*.

The Council reported that they had appointed Dr. T. C. Jerdon and Mr. J. Obbard members of their body in the place of Dr. W. Crozier and Hon'ble W. Grey.

A letter from Capt. H. L. de la Chaumette, intimating his desire to withdraw from the Society, was recorded.

S. Lobb, Esq., M. A. proposed at the last meeting, was balloted for and duly elected an ordinary member.

The following gentlemen were named for ballot as ordinary members at the next meeting.

F. Fedden, Esq., Geological Survey, proposed by Mr. W. Theobald, seconded by Mr. J. G. Medlicott.

Hon'ble J. P. Norman, proposed by the President, and seconded by Lieutenant-Colonel Thuillier.

Hon'ble H. S. Maine, M. A. proposed by the President and seconded by Mr. Cowell.

M. S. Howell, Esq., C. S., proposed by E. C. Bayley, Esq., seconded by J. W. S. Wyllie, Esq.

R. A. Sterndale, Esq., proposed by Dr. T. C. Jerdon and seconded by Hon'ble C. Beadon.

J. Squire, Esq., Bengal Army, proposed by Dr. T. C. Jerdon and seconded by the President.

The Council also named for ballot at the next meeting Dr. T. Goldstucker, Professor of Sanscrit, London University, as a Corresponding Member.

Communications were received—

1. From the Under-Secretary to the Government of India, Public Works Department, forwarding copy of a letter from the Secretary to the Government of Bengal, Public Works Department containing extracts from a report by the Executive Engineer, Upper Assam, of interesting ancient works in that Province visited during 1861-62.

2. From Baboo Gopinauth Sen, abstracts of the results of the Hourly Meteorological Observations taken at the Surveyor General's office in September last.

Dr. Anderson read his paper on the Flora of Parisnath.

The thanks of the meeting were voted to him for his valuable communication.





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.779                                          | 29.849                                    | 29.712  | 0.137   | 86.9                          | 100.0                                         | 78.2 | 21.8  |
| 2     | .781                                            | .851                                      | .718    | .133    | 85.9                          | 96.2                                          | 78.0 | 18.2  |
| 3     | .751                                            | .838                                      | .680    | .158    | 86.8                          | 100.8                                         | 76.2 | 24.6  |
| 4     | .689                                            | .769                                      | .607    | .162    | 84.8                          | 93.4                                          | 77.4 | 16.0  |
| 5     | .695                                            | .763                                      | .602    | .161    | 82.7                          | 91.6                                          | 75.0 | 16.6  |
| 6     | .719                                            | .798                                      | .643    | .155    | 83.0                          | 94.2                                          | 74.2 | 20.0  |
| 7     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 8     | .714                                            | .798                                      | .625    | .173    | 85.4                          | 96.2                                          | 78.4 | 17.8  |
| 9     | .694                                            | .751                                      | .614    | .137    | 85.3                          | 94.8                                          | 78.5 | 16.3  |
| 10    | .697                                            | .765                                      | .621    | .144    | 85.2                          | 94.4                                          | 78.2 | 16.2  |
| 11    | .688                                            | .776                                      | .593    | .183    | 85.1                          | 93.8                                          | 78.6 | 15.2  |
| 12    | .679                                            | .735                                      | .611    | .124    | 84.9                          | 93.0                                          | 76.2 | 16.8  |
| 13    | .667                                            | .752                                      | .590    | .162    | 86.5                          | 94.7                                          | 80.6 | 14.1  |
| 14    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 15    | .636                                            | .698                                      | .581    | .117    | 87.6                          | 97.4                                          | 82.2 | 15.2  |
| 16    | .683                                            | .748                                      | .627    | .121    | 88.1                          | 97.8                                          | 82.2 | 15.6  |
| 17    | .705                                            | .782                                      | .644    | .138    | 88.3                          | 98.0                                          | 81.8 | 16.2  |
| 18    | .716                                            | .782                                      | .659    | .123    | 87.6                          | 95.8                                          | 81.4 | 14.4  |
| 19    | .715                                            | .780                                      | .668    | .112    | 86.7                          | 95.2                                          | 82.1 | 13.1  |
| 20    | .696                                            | .772                                      | .621    | .151    | 87.6                          | 98.2                                          | 82.6 | 15.6  |
| 21    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 22    | .690                                            | .742                                      | .585    | .157    | 83.3                          | 95.2                                          | 75.8 | 19.4  |
| 23    | .730                                            | .789                                      | .671    | .118    | 81.3                          | 93.2                                          | 72.0 | 21.2  |
| 24    | .769                                            | .838                                      | .710    | .128    | 83.3                          | 93.4                                          | 78.4 | 15.0  |
| 25    | .805                                            | .885                                      | .756    | .129    | 83.7                          | 92.0                                          | 75.8 | 16.2  |
| 26    | .787                                            | .869                                      | .700    | .169    | 85.8                          | 96.8                                          | 78.4 | 18.4  |
| 27    | .699                                            | .795                                      | .609    | .186    | 86.9                          | 97.4                                          | 79.5 | 17.9  |
| 28    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 29    | .599                                            | .664                                      | .535    | .129    | 86.0                          | 96.0                                          | 79.4 | 16.6  |
| 30    | .719                                            | .821                                      | .653    | .168    | 86.4                          | 96.6                                          | 75.6 | 21.0  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete saturā-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 78.0                            | 8.9                 | 73.5                | 13.4                         | 0.814                            | 8.67                                             | 4.58                                                                    | 0.65                                                                |
| 2     | 76.1                            | 9.8                 | 71.2                | 14.7                         | .756                             | .05                                              | .82                                                                     | .63                                                                 |
| 3     | 75.0                            | 11.8                | 69.1                | 17.7                         | .706                             | 7.50                                             | 5.71                                                                    | .57                                                                 |
| 4     | 77.5                            | 7.3                 | 73.8                | 11.0                         | .822                             | 8.78                                             | 3.68                                                                    | .71                                                                 |
| 5     | 76.7                            | 6.0                 | 73.7                | 9.0                          | .819                             | .80                                              | 2.92                                                                    | .75                                                                 |
| 6     | 75.5                            | 7.5                 | 71.7                | 11.3                         | .768                             | .24                                              | 3.58                                                                    | .70                                                                 |
| 7     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 8     | 78.3                            | 7.1                 | 74.7                | 10.7                         | .846                             | 9.03                                             | .65                                                                     | .71                                                                 |
| 9     | 78.9                            | 6.4                 | 75.7                | 9.6                          | .873                             | .32                                              | .32                                                                     | .74                                                                 |
| 10    | 78.6                            | 6.6                 | 75.3                | 9.9                          | .862                             | .21                                              | .40                                                                     | .73                                                                 |
| 11    | 77.9                            | 7.2                 | 74.3                | 10.8                         | .835                             | 8.92                                             | .65                                                                     | .71                                                                 |
| 12    | 77.6                            | 7.3                 | 73.9                | 11.0                         | .824                             | .81                                              | .68                                                                     | .71                                                                 |
| 13    | 79.6                            | 6.9                 | 76.1                | 10.4                         | .885                             | 9.44                                             | .66                                                                     | .72                                                                 |
| 14    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 15    | 80.7                            | 6.9                 | 77.2                | 10.4                         | .916                             | .75                                              | .77                                                                     | .72                                                                 |
| 16    | 80.9                            | 7.2                 | 77.3                | 10.8                         | .919                             | .76                                              | .96                                                                     | .71                                                                 |
| 17    | 80.8                            | 7.5                 | 77.0                | 11.3                         | .910                             | .67                                              | 4.13                                                                    | .70                                                                 |
| 18    | 80.5                            | 7.1                 | 76.9                | 10.7                         | .908                             | .64                                              | 3.88                                                                    | .71                                                                 |
| 19    | 80.3                            | 6.4                 | 77.1                | 9.6                          | .913                             | .72                                              | .46                                                                     | .74                                                                 |
| 20    | 80.6                            | 7.0                 | 77.1                | 10.5                         | .913                             | .70                                              | .82                                                                     | .72                                                                 |
| 21    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 22    | 76.2                            | 7.1                 | 72.6                | 10.7                         | .790                             | 8.47                                             | .46                                                                     | .71                                                                 |
| 23    | 75.3                            | 6.0                 | 72.3                | 9.0                          | .783                             | .43                                              | 2.81                                                                    | .75                                                                 |
| 24    | 77.7                            | 5.6                 | 74.9                | 8.4                          | .851                             | 9.13                                             | .80                                                                     | .77                                                                 |
| 25    | 76.1                            | 7.6                 | 72.3                | 11.4                         | .783                             | 8.39                                             | 3.68                                                                    | .70                                                                 |
| 26    | 78.2                            | 7.6                 | 74.4                | 11.4                         | .838                             | .95                                              | .88                                                                     | .70                                                                 |
| 27    | 78.4                            | 8.5                 | 74.1                | 12.8                         | .830                             | .83                                              | 4.42                                                                    | .67                                                                 |
| 28    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 29    | 79.5                            | 6.5                 | 76.2                | 9.8                          | .887                             | 9.47                                             | 3.44                                                                    | .73                                                                 |
| 30    | 78.4                            | 8.0                 | 74.4                | 12.0                         | .838                             | 8.93                                             | 4.13                                                                    | .68                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahrt. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|--------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                  | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                          | Inches.                                                      | Inches. | Inches. | °                             | °                                                              | °    | °     |
| Mid-<br>night. | 29.721                                           | 29.826                                                       | 29.589  | 0.237   | 80.9                          | 84.4                                                           | 75.2 | 9.2   |
| 1              | .710                                             | .806                                                         | .581    | .225    | 80.4                          | 83.8                                                           | 74.1 | 9.7   |
| 2              | .701                                             | .789                                                         | .579    | .210    | 79.8                          | 83.4                                                           | 73.2 | 10.2  |
| 3              | .690                                             | .770                                                         | .575    | .195    | 79.4                          | 83.0                                                           | 73.0 | 10.0  |
| 4              | .696                                             | .780                                                         | .572    | .208    | 79.1                          | 82.7                                                           | 72.6 | 10.1  |
| 5              | .701                                             | .789                                                         | .587    | .202    | 79.1                          | 82.8                                                           | 72.2 | 10.6  |
| 6              | .724                                             | .825                                                         | .590    | .235    | 78.8                          | 82.6                                                           | 72.0 | 10.6  |
| 7              | .742                                             | .834                                                         | .609    | .225    | 79.7                          | 83.4                                                           | 73.4 | 10.0  |
| 8              | .764                                             | .857                                                         | .634    | .223    | 83.2                          | 86.6                                                           | 78.8 | 7.8   |
| 9              | .778                                             | .885                                                         | .624    | .261    | 86.4                          | 89.4                                                           | 83.0 | 6.4   |
| 10             | .778                                             | .885                                                         | .664    | .221    | 88.8                          | 91.4                                                           | 85.6 | 5.8   |
| 11             | .765                                             | .875                                                         | .641    | .234    | 91.7                          | 95.0                                                           | 87.3 | 7.7   |
| Noon.          | .745                                             | .845                                                         | .624    | .221    | 93.7                          | 97.8                                                           | 87.7 | 10.1  |
| 1              | .718                                             | .823                                                         | .596    | .227    | 94.9                          | 100.0                                                          | 86.4 | 13.6  |
| 2              | .690                                             | .802                                                         | .569    | .233    | 95.1                          | 100.8                                                          | 88.6 | 12.2  |
| 3              | .666                                             | .779                                                         | .550    | .229    | 94.5                          | 100.1                                                          | 86.4 | 13.7  |
| 4              | .642                                             | .766                                                         | .535    | .231    | 93.0                          | 98.0                                                           | 84.8 | 13.2  |
| 5              | .644                                             | .756                                                         | .574    | .182    | 90.6                          | 95.6                                                           | 84.4 | 11.2  |
| 6              | .656                                             | .765                                                         | .569    | .196    | 87.4                          | 93.2                                                           | 74.6 | 18.6  |
| 7              | .675                                             | .776                                                         | .590    | .186    | 85.1                          | 91.4                                                           | 77.0 | 14.4  |
| 8              | .690                                             | .777                                                         | .605    | .172    | 83.6                          | 89.6                                                           | 75.8 | 13.8  |
| 9              | .712                                             | .800                                                         | .630    | .170    | 82.5                          | 88.8                                                           | 75.4 | 13.4  |
| 10             | .727                                             | .815                                                         | .643    | .172    | 81.9                          | 85.4                                                           | 75.0 | 10.4  |
| 11             | .728                                             | .838                                                         | .653    | .185    | 81.4                          | 85.6                                                           | 75.4 | 10.2  |

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional Weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 76.5                          | 4.4                 | 74.3                | 6.6                          | 0.835                            | 8.99                                                  | 2.11                                                                | 0.81                                                                |
| 1              | 76.4                          | 4.0                 | 74.4                | 6.0                          | .838                             | 9.04                                                  | 1.90                                                                | .83                                                                 |
| 2              | 76.0                          | 3.8                 | 74.1                | 5.7                          | .830                             | 8.96                                                  | .79                                                                 | .83                                                                 |
| 3              | 75.8                          | 3.6                 | 74.0                | 5.4                          | .827                             | .95                                                   | .67                                                                 | .84                                                                 |
| 4              | 75.7                          | 3.4                 | 74.0                | 5.1                          | .827                             | .95                                                   | .58                                                                 | .85                                                                 |
| 5              | 76.1                          | 3.0                 | 74.6                | 4.5                          | .843                             | 9.11                                                  | .42                                                                 | .87                                                                 |
| 6              | 75.7                          | 3.1                 | 74.1                | 4.7                          | .830                             | 8.98                                                  | .46                                                                 | .86                                                                 |
| 7              | 76.4                          | 3.3                 | 74.7                | 5.0                          | .846                             | 9.14                                                  | .58                                                                 | .85                                                                 |
| 8              | 77.7                          | 5.5                 | 74.9                | 8.3                          | .851                             | .13                                                   | 2.76                                                                | .77                                                                 |
| 9              | 78.9                          | 7.5                 | 75.1                | 11.3                         | .857                             | .13                                                   | 3.93                                                                | .70                                                                 |
| 10             | 79.6                          | 9.2                 | 75.0                | 13.8                         | .854                             | .05                                                   | 4.95                                                                | .65                                                                 |
| 11             | 80.6                          | 11.1                | 75.0                | 16.7                         | .854                             | 8.99                                                  | 6.24                                                                | .59                                                                 |
| Noon.          | 81.2                          | 12.5                | 74.9                | 18.8                         | .851                             | .93                                                   | 7.20                                                                | .55                                                                 |
| 1              | 81.3                          | 13.6                | 74.5                | 20.4                         | .840                             | .81                                                   | .88                                                                 | .53                                                                 |
| 2              | 81.5                          | 13.6                | 74.7                | 20.4                         | .846                             | .86                                                   | .93                                                                 | .53                                                                 |
| 3              | 81.2                          | 13.3                | 74.5                | 20.0                         | .840                             | .81                                                   | .70                                                                 | .53                                                                 |
| 4              | 80.3                          | 12.7                | 73.9                | 19.1                         | .824                             | .67                                                   | .14                                                                 | .55                                                                 |
| 5              | 80.0                          | 10.6                | 74.7                | 15.9                         | .846                             | .93                                                   | 5.83                                                                | .61                                                                 |
| 6              | 78.8                          | 8.6                 | 74.5                | 12.9                         | .840                             | .94                                                   | 4.51                                                                | .67                                                                 |
| 7              | 78.2                          | 6.9                 | 74.7                | 10.4                         | .846                             | 9.05                                                  | 3.52                                                                | .72                                                                 |
| 8              | 77.7                          | 5.9                 | 74.7                | 8.9                          | .846                             | .06                                                   | 2.97                                                                | .75                                                                 |
| 9              | 77.1                          | 5.4                 | 74.4                | 8.1                          | .838                             | .00                                                   | .64                                                                 | .77                                                                 |
| 10             | 76.9                          | 5.0                 | 74.4                | 7.5                          | .838                             | .00                                                   | .44                                                                 | .79                                                                 |
| 11             | 76.5                          | 4.9                 | 74.0                | 7.4                          | .827                             | 8.91                                                  | 2.36                                                                | .79                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observation,  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                   |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches                          |                                   |                                                                                                                              |
| 1     | 141.0                 | ..                              | S.                                | Cloudy till 6 A. M. cloudless afterwards.                                                                                    |
| 2     | 135.2                 | ..                              | S.                                | Cloudless.                                                                                                                   |
| 3     | 144.5                 | ..                              | S.                                | Cloudless.                                                                                                                   |
| 4     | 127.8                 | ..                              | S.                                | Cloudless till 7 A. M. Scatd. clouds afterwards.                                                                             |
| 5     | 128.5                 | 0.16                            | S. & S. W.                        | Cloudy; also drizzling at 1 & 2 A. M. from 7 to 9 P. M.                                                                      |
| 6     | 139.0                 | ..                              | S.                                | Cloudy till 4 A. M. cloudless afterwards.                                                                                    |
| 7     | <i>Sunday.</i>        | ..                              |                                   |                                                                                                                              |
| 8     | 132.6                 | ..                              | S.                                | Cloudless.                                                                                                                   |
| 9     | 134.0                 | ..                              | S.                                | Scatd. clouds till 3 A. M. cloudless afterwards.                                                                             |
| 10    | 130.0                 | ..                              | S.                                | Cloudless.                                                                                                                   |
| 11    | 131.4                 | ..                              | S.                                | Cloudless till 5 A. M. Scatd. clouds afterwards.                                                                             |
| 12    | 126.7                 | ..                              | S.                                | Cloudless till 9 A. M. Scatd. $\searrow$ i till 5 P. M. cloudy afterwards.                                                   |
| 13    | 136.8                 | ..                              | S.                                | Scatd. clouds till 2 P. M. cloudless afterwards.                                                                             |
| 14    | <i>Sunday.</i>        | ..                              |                                   |                                                                                                                              |
| 15    | 132.0                 | ..                              | S.                                | Scatd. clouds till 11 A. M. cloudless afterwards.                                                                            |
| 16    | 132.4                 | ..                              | S. & S. W.                        | Cloudless.                                                                                                                   |
| 17    | 135.4                 | ..                              | S.                                | Cloudless till 5 P. M. Scatd. clouds afterwards.                                                                             |
| 18    | 130.6                 | ..                              | S.                                | Cloudless till 7 P. M. Scatd. clouds afterwards.                                                                             |
| 19    | 131.2                 | ..                              | S.                                | Scatd. clouds till 7 P. M. cloudless afterwards.                                                                             |
| 20    | 132.0                 | ..                              | S.                                | Scatd. clouds.                                                                                                               |
| 21    | <i>Sunday.</i>        | ..                              |                                   |                                                                                                                              |
| 22    | 130.0                 | 0.15                            | S.                                | Cloudy; also raining between 5 & 6 P. M.                                                                                     |
| 23    | 124.6                 | ..                              | S. E. & E. & S.                   | Cloudless till 11 A. M. cloudy till 8 P. M. cloudless afterwards, also drizzling at 3 P. M.                                  |
| 24    | 127.8                 | ..                              | S. & S. E.                        | Scatd. clouds; also drizzling between 3 to 4 P. M.                                                                           |
| 25    | 126.8                 | ..                              | S. & E.                           | Scatd. $\searrow$ i & $\nearrow$ i till 4 P. M. cloudless afterwards, also drizzled at 1 P. M.                               |
| 26    | 135.0                 | ..                              | S.                                | Cloudless till 8 A. M. Scatd. $\searrow$ i & $\nearrow$ i till 8 P. M. cloudy afterwards also drizzling between 9 & 10 P. M. |

$\searrow$ i Cirri,  $\searrow$ i Cirro strati,  $\nearrow$ i Cumuli,  $\nearrow$ i Cumulo strati,  $\searrow$ i Nimbi, —i Strati,  $\searrow$ i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                     |
|-------|-----------------------|---------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|       |                       | Inches.                         |                                   |                                                                                                                                |
| 27    | 127.8                 | ..                              | S. & S. W.                        | Cloudless till 11 A. M. Scatd. clouds afterwards.                                                                              |
| 28    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                                |
| 29    | 132.0                 | ..                              | S.                                | Cloudless till 7 A. M. Scatd. clouds afterwards.                                                                               |
| 30    | 135.0                 | ..                              | E.                                | Cloudless till 10 A. M. Scatd. $\searrow$ i & $\nearrow$ i till 5 P. M. cloudy afterwards; also slightly drizzling at 11 P. M. |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

MONTHLY RESULTS.

|                                                                    |    |    | Inches |
|--------------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                        | .. | .. | 29.711 |
| Max. height of the Barometer occurred at 9 & 10 A. M. on the 25th, | .. | .. | 29.885 |
| Min. height of the Barometer occurred at 4 P. M. on the 29th,      | .. | .. | 29.535 |
| <i>Extreme range</i> of the Barometer during the month,            | .. | .. | 0.350  |
| Mean of the Daily Max. Pressures,                                  | .. | .. | 29.785 |
| Ditto ditto Min. ditto,                                            | .. | .. | 29.640 |
| <i>Mean daily range</i> of the Barometer during the month,         | .. | .. | 0.145  |

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|                                                              |    |    | °     |
|--------------------------------------------------------------|----|----|-------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 85.6  |
| Max. Temperature occurred at 2 P. M. on the 3rd,             | .. | .. | 100.8 |
| Min. Temperature occurred at 6 A. M. on the 23rd,            | .. | .. | 72.0  |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 28.8  |
| Mean of the daily Max. Temperature,                          | .. | .. | 95.6  |
| Ditto ditto Min. ditto,                                      | .. | .. | 78.3  |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 17.3  |
| Mean Wet Bulb Thermometer for the month,                     | .. | .. | 78.2  |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,   | .. | .. | 7.4   |
| Computed Mean Dew-point for the month,                       | .. | .. | 74.5  |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,     | .. | .. | 11.1  |

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|                                             |    |    | Inches |
|---------------------------------------------|----|----|--------|
| Mean Elastic force of Vapour for the month, | .. | .. | 0.840  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 8.98        |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 3.78        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.70        |

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|                                                   |    |    | Inches |
|---------------------------------------------------|----|----|--------|
| Rained 7 days, Max. fall of rain during 24 hours, | .. | .. | 0.16   |
| Total amount of rain during the month,            | .. | .. | 0.31   |
| Prevailing direction of the Wind,                 | .. | .. | S.     |

*Abstract of the Results of the Hourly Metcorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. |              |          |       |          | 1  |          | 1     |          | 20 |          | 1     |          |    |          |       |          | 1     |          | 2       |
| 1         |              |          |       |          | 1  |          | 1     |          | 21 |          | 1     |          |    |          |       |          | 1     |          | 1       |
| 2         |              |          |       |          | 3  |          | 1     |          | 21 | 1        | 1     |          |    |          |       |          |       |          |         |
| 3         |              |          |       |          | 2  |          | 2     |          | 19 | 1        | 1     |          |    |          |       |          |       |          | 2       |
| 4         |              |          |       |          | 2  |          | 2     |          | 14 |          | 1     |          |    |          |       |          |       |          | 7       |
| 5         |              |          |       |          | 3  |          | 2     |          | 18 |          | 1     |          |    |          |       |          |       |          | 2       |
| 6         |              |          |       |          | 4  |          | 3     |          | 19 |          |       |          |    |          |       |          |       |          |         |
| 7         |              |          | 1     |          | 2  |          | 4     |          | 18 |          | 1     |          |    |          |       |          |       |          |         |
| 8         |              |          |       |          | 3  |          | 3     |          | 18 |          | 1     |          |    |          |       |          |       |          | 1       |
| 9         |              |          |       |          | 2  |          | 3     |          | 19 |          | 1     |          | 1  |          |       |          |       |          |         |
| 10        |              |          |       |          | 2  |          | 2     |          | 16 |          | 5     |          | 1  |          |       |          |       |          |         |
| 11        |              |          |       |          |    |          | 2     |          | 14 |          | 8     |          |    |          | 2     |          |       |          |         |
| Noon.     |              |          |       |          | 1  |          | 1     |          | 18 |          | 4     |          | 1  |          | 1     |          |       |          |         |
| 1         |              |          |       |          | 1  |          | 1     |          | 19 | 1        | 5     |          |    |          |       |          |       |          |         |
| 2         |              |          |       |          | 1  |          | 2     |          | 20 |          | 2     |          | 1  |          |       |          |       |          |         |
| 3         |              |          |       |          | 1  |          | 2     | 1        | 22 | 1        |       |          | 1  |          |       |          |       |          |         |
| 4         |              |          | 1     |          | 1  |          | 2     |          | 18 | 1        | 2     |          |    |          |       |          |       |          | 2       |
| 5         |              |          |       |          | 1  |          | 4     |          | 20 |          | 1     |          |    |          |       |          |       |          |         |
| 6         |              |          |       |          | 2  |          | 2     |          | 21 |          |       |          | 1  |          | 1     |          |       |          |         |
| 7         |              |          |       |          | 2  |          | 2     |          | 19 |          |       |          | 3  |          | 1     |          |       |          |         |
| 8         |              |          |       |          | 3  |          | 2     |          | 17 |          | 1     |          | 2  |          | 1     |          |       |          | 1       |
| 9         |              |          | 1     |          | 4  |          |       |          | 16 |          | 3     | 1        | 1  |          |       |          | 1     |          |         |
| 10        |              |          | 1     |          | 3  |          | 1     |          | 16 |          | 2     | 1        | 1  |          |       |          | 1     |          | 1       |
| 11        |              |          | 1     |          | 3  |          |       |          | 17 |          | 3     |          | 1  |          | 1     | 1        |       |          |         |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.767                                          | 29.850                                    | 29.679  | 0.171   | 88.1                          | 100.0                                         | 77.8 | 22.2  |
| 2     | .727                                            | .825                                      | .610    | .215    | 88.9                          | 98.0                                          | 82.2 | 15.8  |
| 3     | .656                                            | .705                                      | .574    | .131    | 83.0                          | 96.2                                          | 74.3 | 21.9  |
| 4     | .623                                            | .694                                      | .530    | .164    | 85.2                          | 94.8                                          | 75.4 | 19.4  |
| 5     | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 6     | .621                                            | .696                                      | .544    | .152    | 88.4                          | 96.6                                          | 82.6 | 14.0  |
| 7     | .575                                            | .633                                      | .496    | .137    | 88.3                          | 95.6                                          | 83.5 | 12.1  |
| 8     | .569                                            | .636                                      | .497    | .139    | 88.1                          | 97.0                                          | 77.6 | 19.4  |
| 9     | .600                                            | .685                                      | .500    | .185    | 80.7                          | 91.2                                          | 72.4 | 18.8  |
| 10    | .622                                            | .690                                      | .565    | .125    | 82.8                          | 93.2                                          | 74.2 | 19.0  |
| 11    | .669                                            | .729                                      | .608    | .121    | 85.8                          | 96.0                                          | 78.8 | 17.2  |
| 12    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 13    | .672                                            | .752                                      | .584    | .168    | 89.3                          | 98.0                                          | 82.2 | 15.8  |
| 14    | .649                                            | .714                                      | .568    | .146    | 87.9                          | 98.0                                          | 82.2 | 15.8  |
| 15    | .667                                            | .756                                      | .587    | .169    | 87.4                          | 96.4                                          | 80.8 | 15.6  |
| 16    | .708                                            | .786                                      | .635    | .151    | 85.8                          | 96.8                                          | 78.0 | 18.8  |
| 17    | .684                                            | .758                                      | .590    | .168    | 88.7                          | 97.2                                          | 82.6 | 14.6  |
| 18    | .680                                            | .814                                      | .578    | .236    | 84.5                          | 92.2                                          | 80.4 | 11.8  |
| 19    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 20    | .541                                            | .603                                      | .475    | .128    | 83.5                          | 91.2                                          | 79.0 | 12.2  |
| 21    | .497                                            | .546                                      | .420    | .126    | 86.9                          | 94.2                                          | 79.8 | 14.4  |
| 22    | .484                                            | .539                                      | .393    | .146    | 86.3                          | 90.8                                          | 82.4 | 8.4   |
| 23    | .451                                            | .504                                      | .369    | .135    | 87.2                          | 95.8                                          | 82.4 | 13.4  |
| 24    | .451                                            | .497                                      | .385    | .112    | 86.6                          | 93.6                                          | 81.8 | 11.8  |
| 25    | .460                                            | .521                                      | .417    | .104    | 85.0                          | 92.7                                          | 77.6 | 15.1  |
| 26    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 27    | .595                                            | .646                                      | .526    | .120    | 86.8                          | 93.8                                          | 81.0 | 12.8  |
| 28    | .643                                            | .741                                      | .574    | .167    | 85.3                          | 92.2                                          | 74.8 | 17.4  |
| 29    | .661                                            | .710                                      | .594    | .116    | 80.0                          | 87.8                                          | 74.8 | 13.0  |
| 30    | .617                                            | .680                                      | .533    | .147    | 83.2                          | 91.8                                          | 77.4 | 14.4  |
| 31    | .590                                            | .631                                      | .509    | .122    | 84.3                          | 91.1                                          | 77.5 | 13.6  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 77.6                            | 10.5                | 72.3                | 15.8                         | 0.783                            | 8.31                                             | 5.41                                                                    | 0.61                                                              |
| 2     | 80.7                            | 8.2                 | 76.6                | 12.3                         | .899                             | 9.54                                             | 4.50                                                                    | .68                                                               |
| 3     | 76.7                            | 6.3                 | 73.5                | 9.5                          | .814                             | 8.72                                             | 3.10                                                                    | .74                                                               |
| 4     | 80.3                            | 4.9                 | 77.8                | 7.4                          | .934                             | 9.99                                             | .62                                                                     | .79                                                               |
| 5     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 6     | 81.7                            | 6.7                 | 78.3                | 10.1                         | .949                             | 10.07                                            | 3.77                                                                    | .73                                                               |
| 7     | 80.7                            | 7.6                 | 76.9                | 11.4                         | .908                             | 9.64                                             | 4.16                                                                    | .70                                                               |
| 8     | 80.4                            | 7.7                 | 76.5                | 11.6                         | .896                             | .52                                              | .20                                                                     | .69                                                               |
| 9     | 74.7                            | 6.0                 | 71.7                | 9.0                          | .768                             | 8.28                                             | 2.76                                                                    | .75                                                               |
| 10    | 76.4                            | 6.4                 | 73.2                | 9.6                          | .806                             | .64                                              | 3.11                                                                    | .74                                                               |
| 11    | 79.2                            | 6.6                 | 75.9                | 9.9                          | .879                             | 9.38                                             | .45                                                                     | .73                                                               |
| 12    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 13    | 81.0                            | 8.3                 | 76.8                | 12.5                         | .905                             | .57                                              | 4.64                                                                    | .67                                                               |
| 14    | 80.3                            | 7.6                 | 76.5                | 11.4                         | .896                             | .54                                              | .10                                                                     | .70                                                               |
| 15    | 80.1                            | 7.3                 | 76.4                | 11.0                         | .893                             | .51                                              | 3.94                                                                    | .71                                                               |
| 16    | 78.7                            | 7.1                 | 75.1                | 10.7                         | .857                             | .13                                              | .70                                                                     | .71                                                               |
| 17    | 80.7                            | 8.0                 | 76.7                | 12.0                         | .902                             | .56                                              | 4.40                                                                    | .69                                                               |
| 18    | 80.1                            | 4.4                 | 77.9                | 6.6                          | .937                             | 10.02                                            | 2.33                                                                    | .81                                                               |
| 19    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 20    | 78.8                            | 4.7                 | 76.4                | 7.1                          | .893                             | 9.58                                             | .42                                                                     | .80                                                               |
| 21    | 80.2                            | 6.7                 | 76.8                | 10.1                         | .905                             | .63                                              | 3.62                                                                    | .73                                                               |
| 22    | 81.0                            | 5.3                 | 78.3                | 8.0                          | .949                             | 10.12                                            | 2.90                                                                    | .78                                                               |
| 23    | 80.8                            | 6.4                 | 77.6                | 9.6                          | .928                             | 9.87                                             | 3.50                                                                    | .74                                                               |
| 24    | 80.8                            | 5.8                 | 77.9                | 8.7                          | .937                             | .98                                              | .16                                                                     | .76                                                               |
| 25    | 80.8                            | 4.2                 | 78.7                | 6.3                          | .961                             | 10.29                                            | 2.24                                                                    | .82                                                               |
| 26    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 27    | 81.3                            | 5.5                 | 78.5                | 8.3                          | .955                             | .18                                              | 3.03                                                                    | .77                                                               |
| 28    | 80.2                            | 5.1                 | 77.6                | 7.7                          | .928                             | 9.91                                             | 2.73                                                                    | .78                                                               |
| 29    | 77.5                            | 2.5                 | 76.2                | 3.8                          | .887                             | .58                                              | 1.23                                                                    | .89                                                               |
| 30    | 78.8                            | 4.4                 | 76.6                | 6.6                          | .899                             | .63                                              | 2.26                                                                    | .81                                                               |
| 31    | 80.1                            | 4.2                 | 78.0                | 6.3                          | .940                             | 10.07                                            | .21                                                                     | .82                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.613                                          | 29.766                                                       | 29.451  | 0.315   | 81.8                          | 85.7                                                                | 75.4 | 10.3  |
| 1              | .609                                            | .765                                                         | .446    | .319    | 81.4                          | 85.4                                                                | 75.2 | 10.2  |
| 2              | .600                                            | .756                                                         | .438    | .318    | 81.2                          | 85.2                                                                | 74.8 | 10.4  |
| 3              | .596                                            | .744                                                         | .429    | .315    | 81.2                          | 84.8                                                                | 75.2 | 9.6   |
| 4              | .601                                            | .751                                                         | .421    | .330    | 81.1                          | 84.2                                                                | 74.8 | 9.4   |
| 5              | .610                                            | .758                                                         | .426    | .332    | 80.5                          | 84.0                                                                | 74.2 | 9.8   |
| 6              | .625                                            | .788                                                         | .414    | .374    | 80.8                          | 84.0                                                                | 76.0 | 8.0   |
| 7              | .644                                            | .813                                                         | .462    | .351    | 81.8                          | 85.6                                                                | 77.0 | 8.6   |
| 8              | .662                                            | .840                                                         | .487    | .353    | 85.2                          | 88.5                                                                | 80.2 | 8.3   |
| 9              | .667                                            | .850                                                         | .490    | .360    | 87.4                          | 90.0                                                                | 82.6 | 7.4   |
| 10             | .667                                            | .844                                                         | .492    | .352    | 89.7                          | 92.9                                                                | 84.6 | 8.3   |
| 11             | .656                                            | .826                                                         | .482    | .344    | 91.1                          | 95.4                                                                | 82.2 | 13.2  |
| Noon.          | .637                                            | .811                                                         | .465    | .346    | 92.3                          | 96.8                                                                | 82.8 | 14.0  |
| 1              | .613                                            | .776                                                         | .446    | .330    | 93.0                          | 98.6                                                                | 79.4 | 19.2  |
| 2              | .584                                            | .743                                                         | .409    | .334    | 93.4                          | 99.2                                                                | 78.2 | 21.0  |
| 3              | .560                                            | .704                                                         | .392    | .312    | 93.4                          | 100.0                                                               | 79.2 | 20.8  |
| 4              | .538                                            | .679                                                         | .369    | .310    | 91.2                          | 98.8                                                                | 80.8 | 18.0  |
| 5              | .541                                            | .698                                                         | .380    | .318    | 89.3                          | 98.8                                                                | 78.8 | 20.0  |
| 6              | .553                                            | .725                                                         | .392    | .333    | 87.1                          | 94.0                                                                | 78.0 | 16.0  |
| 7              | .580                                            | .746                                                         | .421    | .325    | 85.0                          | 91.4                                                                | 72.4 | 19.0  |
| 8              | .606                                            | .747                                                         | .431    | .316    | 84.0                          | 89.0                                                                | 74.0 | 15.0  |
| 9              | .620                                            | .749                                                         | .448    | .301    | 83.0                          | 87.8                                                                | 73.8 | 14.0  |
| 10             | .629                                            | .790                                                         | .461    | .329    | 82.3                          | 86.4                                                                | 75.0 | 11.4  |
| 11             | .620                                            | .756                                                         | .466    | .290    | 81.7                          | 85.6                                                                | 74.8 | 10.8  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 77.9                            | 3.9                 | 75.9                | 5.9                          | 0.879                            | 9.46                                                  | 1.94                                                                     | 0.83                                                                 |
| 1              | 77.9                            | 3.5                 | 76.1                | 5.3                          | .885                             | .53                                                   | .74                                                                      | .85                                                                  |
| 2              | 77.7                            | 3.5                 | 75.9                | 5.3                          | .879                             | .47                                                   | .74                                                                      | .85                                                                  |
| 3              | 78.1                            | 3.1                 | 76.5                | 4.7                          | .896                             | .65                                                   | .56                                                                      | .86                                                                  |
| 4              | 77.9                            | 3.2                 | 76.3                | 4.8                          | .890                             | .59                                                   | .58                                                                      | .86                                                                  |
| 5              | 77.6                            | 2.9                 | 76.1                | 4.4                          | .885                             | .55                                                   | .43                                                                      | .87                                                                  |
| 6              | 77.8                            | 3.0                 | 76.3                | 4.5                          | .890                             | .59                                                   | .48                                                                      | .87                                                                  |
| 7              | 78.6                            | 3.2                 | 77.0                | 4.8                          | .910                             | .79                                                   | .61                                                                      | .86                                                                  |
| 8              | 80.2                            | 5.0                 | 77.7                | 7.5                          | .931                             | .94                                                   | 2.67                                                                     | .79                                                                  |
| 9              | 81.0                            | 6.4                 | 77.8                | 9.6                          | .934                             | .93                                                   | 3.52                                                                     | .74                                                                  |
| 10             | 81.7                            | 8.0                 | 77.7                | 12.0                         | .931                             | .86                                                   | 4.51                                                                     | .69                                                                  |
| 11             | 81.9                            | 9.2                 | 77.3                | 13.8                         | .919                             | .70                                                   | 5.27                                                                     | .65                                                                  |
| Noon.          | 82.3                            | 10.0                | 77.3                | 15.0                         | .919                             | .68                                                   | .82                                                                      | .63                                                                  |
| 1              | 82.3                            | 10.7                | 76.9                | 16.1                         | .908                             | .54                                                   | 6.27                                                                     | .60                                                                  |
| 2              | 82.2                            | 11.2                | 76.6                | 16.8                         | .899                             | .44                                                   | .55                                                                      | .59                                                                  |
| 3              | 82.5                            | 10.9                | 77.0                | 16.4                         | .910                             | .57                                                   | .42                                                                      | .60                                                                  |
| 4              | 81.2                            | 10.0                | 76.2                | 15.0                         | .887                             | .37                                                   | 5.65                                                                     | .62                                                                  |
| 5              | 80.9                            | 8.4                 | 76.7                | 12.6                         | .902                             | .55                                                   | 4.66                                                                     | .67                                                                  |
| 6              | 79.5                            | 7.6                 | 75.7                | 11.4                         | .873                             | .30                                                   | .03                                                                      | .70                                                                  |
| 7              | 78.9                            | 6.1                 | 75.8                | 9.2                          | .876                             | .37                                                   | 3.16                                                                     | .75                                                                  |
| 8              | 78.6                            | 5.4                 | 75.9                | 8.1                          | .879                             | .42                                                   | 2.75                                                                     | .77                                                                  |
| 9              | 78.2                            | 4.8                 | 75.8                | 7.2                          | .876                             | .41                                                   | .41                                                                      | .80                                                                  |
| 10             | 77.9                            | 4.4                 | 75.7                | 6.6                          | .873                             | .38                                                   | .20                                                                      | .81                                                                  |
| 11             | 77.8                            | 3.9                 | 75.8                | 5.9                          | .876                             | .43                                                   | 1.94                                                                     | .83                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                            |
|-------|-----------------------|---------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                                                       |
| 1     | 139.0                 | ...                             | E. & S. E. & S.                   | Cloudy till 3 A. M. cloudless till Noon, cloudy afterwards; also slightly drizzling at 6 P. M.                        |
| 2     | 139.0                 | ...                             | S.                                | Cloudless till 10 A. M. Scatd. ci till 8 P. M. cloudless afterwards.                                                  |
| 3     | 136.2                 | 0.41                            | S. E. & S. & E.                   | Cloudy with rain at 1 & 2 A. M. & 4 & 6 P. M.                                                                         |
| 4     | 117.0                 | ...                             | S. & E.                           | Cloudy & slightly drizzling between 9 & 11 P. M.                                                                      |
| 5     | <i>Sunday.</i>        | ...                             |                                   |                                                                                                                       |
| 6     | 132.0                 | ...                             | S.                                | Cloudless till 7 A. M. Scatd. \-i till 3 P. M. cloudy afterwards.                                                     |
| 7     | 127.0                 | ...                             | S.                                | Scatd. clouds.                                                                                                        |
| 8     | 135.0                 | ...                             | S.                                | Cloudy; also drizzling at 2 & 3 A. M. & 9 P. M.                                                                       |
| 9     | ...                   | 0.22                            | S. & E. & N. W.                   | Cloudy with rain at 1 & 2 P. M. & also from 7 to 11 P. M.                                                             |
| 10    | 124.2                 | 0.82                            | S.                                | Cloudy with rain at 5 A. M.                                                                                           |
| 11    | 126.4                 | ...                             | W.                                | Cloudy till 5 A. M. cloudless till 9 A. M. Scatd. clouds till 7 P. M. cloudless afterwards; also drizzling at 6 P. M. |
| 12    | <i>Sunday.</i>        | ...                             |                                   |                                                                                                                       |
| 13    | 137.0                 | ...                             | S. & E. & calm.                   | Cloudless till 7 A. M. Scatd. clouds till 7 P. M. cloudless afterwards.                                               |
| 14    | 138.8                 | ...                             | S. & S. W.                        | Cloudless till 7 A. M. Scatd. ci till 7 P. M. cloudless afterwards; also drizzling between 5 & 6 P. M.                |
| 15    | 126.0                 | ...                             | S. & S. E.                        | Cloudless till 4 A. M. Scatd. clouds afterwards; also drizzling at 11 P. M.                                           |
| 16    | 140.2                 | 0.12                            | S. & S. E. & S. W.                | Scatd. clouds of divers kinds; also raining at Midnight.                                                              |
| 17    | 134.4                 | ...                             | S.                                | Cloudless till 7 A. M. Scatd. \-i till 7 P. M. cloudy afterwards; also drizzling at 10 P. M.                          |
| 18    | ...                   | ...                             | E. & S.                           | Cloudy; also drizzling at 2 & 3 & 9 A. M. & also at 4 P. M.                                                           |
| 19    | <i>Sunday.</i>        | ...                             |                                   |                                                                                                                       |
| 20    | ...                   | 0.16                            | S. & E. & S. E.                   | Scatd. clouds; also raining between 10 & 11 A. M.                                                                     |
| 21    | ...                   | ...                             | E.                                | Scatd. clouds.                                                                                                        |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                      |
|-------|-----------------------|---------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 22    | ...                   | 0.20                            | E. & S. E.                        | Scatd. $\searrow$ i till 6 A. M. cloudy till 1 P. M. Scatd. clouds afterwards ; also rain between 10 & 11 A. M. |
| 23    | 135.8                 | ...                             | E. & S. W.                        | Scatd $\searrow$ i & $\searrow$ i till 8 A. M. Scatd. $\circ$ i till 4 P. M. cloudy afterwards.                 |
| 24    | 131.0                 | ...                             | S. & S. E.                        | Scatd. clouds.                                                                                                  |
| 25    | ...                   | 1.60                            | S. & E.                           | Cloudy ; also rain at 4 & 5 P. M.                                                                               |
| 26    | <i>Sunday.</i>        | 0.16                            |                                   |                                                                                                                 |
| 27    | 128.4                 | ...                             | S.                                | Scatd. $\searrow$ i till 1 P. M. cloudy afterwards.                                                             |
| 28    | ...                   | ...                             | S.                                | Cloudy ; also rain with thunder and lightning from 8 to 11 P. M.                                                |
| 29    | ...                   | 4.58                            | S. E. & E. & S.                   | Cloudy & raining after intervals.                                                                               |
| 30    | 126.8                 | 0.68                            | N. W. & S. & S. W.                | Cloudy ; also rain from 7 to 10 P. M.                                                                           |
| 31    | ...                   | 0.12                            | S. & S. W.                        | Cloudy ; also rain at Noon & 1 P. M.                                                                            |

$\searrow$ i Cirri,  $\searrow$ i Cirro strati,  $\circ$ i Cumuli,  $\sim$ i Cumulo strati,  $\searrow$ i Nimbi, —i Strati,  $\searrow$  i Cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1861.*

MONTHLY RESULTS.

|                                                                |    |    | Inches |
|----------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                    | .. | .. | 29.610 |
| Max. height of the Barometer, occurred at 9 A. M. on the 1st,  | .. | .. | 29.850 |
| Min. height of the Barometer, occurred at 4 P. M. on the 23rd, | .. | .. | 29.369 |
| <i>Extreme range</i> of the Barometer during the month,        | .. | .. | 0.481  |
| Mean of the daily Max. Pressures,                              | .. | .. | 29.679 |
| Ditto ditto Min. ditto,                                        | .. | .. | 29.531 |
| <i>Mean daily range</i> of the Barometer during the month,     | .. | .. | 0.148  |

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|                                                              |    |    | °     |
|--------------------------------------------------------------|----|----|-------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 85.9  |
| Max. Temperature occurred at 3 P. M. on the 1st,             | .. | .. | 100.0 |
| Min. Temperature occurred at 7 P. M. on the 9th,             | .. | .. | 72.4  |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 27.6  |
| Mean of the daily Max. Temperature,                          | .. | .. | 94.5  |
| Ditto ditto Min. ditto,                                      | .. | .. | 79.0  |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 15.5  |

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|                                                            |    |    | °      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 79.6   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 6.3    |
| Computed Mean Dew-point for the month,                     | .. | .. | 76.4   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 9.5    |
|                                                            |    |    | Inches |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.893  |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 9.53         |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 3.34         |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.74         |

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|                                                    |    |    | Inches  |
|----------------------------------------------------|----|----|---------|
| Rained 20 days, Max. fall of rain during 24 hours, | .. | .. | 1.60    |
| Total amount of rain during the month,             | .. | .. | 9.07    |
| Prevailing direction of the Wind,                  | .. | .. | S. & E. |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1861.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 1            | 1        | 1     | 1        | 4  |          | 3     |          | 13 |          |       |          | 1  |          | 1     |          |       |          | 3       |
| 1         | 1            |          | 1     | 1        | 5  | 1        | 3     |          | 14 |          |       |          | 1  |          | 1     |          | 1     |          |         |
| 2         |              |          | 1     | 1        | 5  | 2        | 2     |          | 13 | 1        |       |          | 1  |          | 1     |          | 3     |          | 1       |
| 3         |              |          |       |          | 4  | 1        | 3     |          | 12 | 1        |       |          | 2  |          |       |          | 2     |          | 4       |
| 4         |              |          |       |          | 1  |          | 1     |          | 15 |          |       |          | 2  |          |       |          | 2     |          | 6       |
| 5         |              |          |       |          | 5  | 1        | 2     |          | 14 |          |       |          | 3  | 1        | 1     |          | 2     |          |         |
| 6         | 1            |          | 1     |          | 5  | 1        | 3     |          | 13 |          |       |          | 2  |          | 1     |          | 1     |          |         |
| 7         | 2            |          | 4     |          | 3  |          | 5     |          | 11 |          |       |          | 1  |          | 1     |          |       |          |         |
| 8         |              |          |       |          | 5  |          | 5     |          | 13 |          | 2     |          | 1  |          | 1     |          |       |          |         |
| 9         |              |          |       |          | 6  | 1        | 3     |          | 11 |          | 5     |          | 1  |          | 1     |          |       |          |         |
| 10        |              |          |       |          | 4  |          | 3     |          | 15 | 1        | 3     |          | 1  |          | 1     |          |       |          |         |
| 11        |              |          |       |          | 4  | 1        | 2     |          | 12 |          | 6     | 1        | 1  |          | 1     |          | 1     |          |         |
| Noon.     |              |          |       |          | 4  |          | 4     |          | 12 | 1        | 5     | 1        | 1  |          | 1     |          |       |          |         |
| 1         | 1            | 1        | 1     |          | 4  |          | 2     |          | 15 | 1        | 3     |          |    |          | 1     |          |       |          |         |
| 2         | 1            |          | 2     |          | 4  | 1        | 4     |          | 12 |          | 4     |          |    |          |       |          |       |          |         |
| 3         | 1            |          | 2     |          | 5  |          | 5     | 1        | 11 |          | 3     |          |    |          |       |          |       |          |         |
| 4         | 1            | 1        |       |          | 5  | 1        | 5     |          | 11 | 1        | 3     |          |    |          |       |          |       |          | 2       |
| 5         | 1            |          |       |          | 7  | 1        | 4     |          | 13 |          | 1     |          |    |          |       |          | 1     |          |         |
| 6         | 1            | 1        |       |          | 6  | 1        | 4     | 1        | 14 |          | 2     | 1        |    |          |       |          |       |          |         |
| 7         | 2            |          |       |          | 5  |          | 4     |          | 10 |          | 1     | 1        |    |          | 2     | 1        | 2     |          |         |
| 8         | 1            | 1        |       |          | 5  |          | 5     |          | 9  |          | 1     | 1        | 1  |          | 2     | 1        | 3     |          |         |
| 9         | 1            | 1        |       |          | 5  | 1        | 7     | 1        | 7  |          | 1     | 1        | 1  | 1        | 2     | 1        | 3     |          |         |
| 10        | 1            | 1        |       |          | 6  | 2        | 5     |          | 9  |          | 1     | 1        |    |          | 2     | 1        | 3     |          |         |
| 11        | 1            | 1        | 1     | 1        | 5  | 1        | 5     |          | 8  |          | 2     |          |    |          | 1     | 1        | 3     |          | 1       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11 <sup>Feet.</sup>

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.553                                          | 29.610                                    | 29.474  | 0.136   | 86.7                          | 94.9                                          | 81.4 | 13.5  |
| 2     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 3     | .505                                            | .560                                      | .435    | .125    | 83.9                          | 92.4                                          | 79.6 | 12.8  |
| 4     | .471                                            | .517                                      | .386    | .131    | 81.4                          | 86.4                                          | 79.0 | 7.4   |
| 5     | .445                                            | .490                                      | .379    | .111    | 85.7                          | 93.3                                          | 79.8 | 13.5  |
| 6     | .449                                            | .505                                      | .401    | .104    | 84.8                          | 91.6                                          | 78.8 | 12.8  |
| 7     | .485                                            | .538                                      | .417    | .121    | 85.5                          | 92.4                                          | 80.3 | 12.1  |
| 8     | .483                                            | .529                                      | .424    | .105    | 86.5                          | 91.8                                          | 83.0 | 8.8   |
| 9     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 10    | .521                                            | .564                                      | .473    | .091    | 78.5                          | 80.0                                          | 76.0 | 4.0   |
| 11    | .532                                            | .582                                      | .472    | .110    | 79.5                          | 83.2                                          | 77.0 | 6.2   |
| 12    | .503                                            | .553                                      | .445    | .108    | 79.0                          | 80.6                                          | 77.0 | 3.6   |
| 13    | .368                                            | .471                                      | .290    | .181    | 77.7                          | 79.2                                          | 76.8 | 2.4   |
| 14    | .517                                            | .574                                      | .444    | .130    | 82.0                          | 86.8                                          | 78.2 | 8.6   |
| 15    | .537                                            | .573                                      | .489    | .084    | 82.5                          | 86.9                                          | 79.2 | 7.7   |
| 16    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 17    | .584                                            | .659                                      | .532    | .127    | 78.4                          | 80.8                                          | 76.6 | 4.2   |
| 18    | .680                                            | .749                                      | .612    | .137    | 81.1                          | 86.0                                          | 76.4 | 9.6   |
| 19    | .725                                            | .779                                      | .651    | .128    | 84.6                          | 89.3                                          | 81.2 | 8.1   |
| 20    | .715                                            | .763                                      | .637    | .126    | 84.4                          | 89.4                                          | 80.8 | 8.6   |
| 21    | .649                                            | .698                                      | .573    | .125    | 84.7                          | 89.6                                          | 81.5 | 8.1   |
| 22    | .640                                            | .684                                      | .585    | .099    | 84.2                          | 87.6                                          | 80.8 | 6.8   |
| 23    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 24    | .717                                            | .755                                      | .670    | .085    | 85.3                          | 90.6                                          | 81.4 | 9.2   |
| 25    | .704                                            | .772                                      | .608    | .164    | 85.4                          | 90.4                                          | 81.4 | 9.0   |
| 26    | .662                                            | .719                                      | .590    | .129    | 85.7                          | 90.4                                          | 81.8 | 8.6   |
| 27    | .633                                            | .679                                      | .565    | .114    | 84.7                          | 91.9                                          | 80.3 | 11.6  |
| 28    | .606                                            | .648                                      | .540    | .108    | 85.3                          | 90.7                                          | 81.0 | 9.7   |
| 29    | .609                                            | .656                                      | .553    | .103    | 83.8                          | 88.0                                          | 81.0 | 7.0   |
| 30    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1     | 81.5                            | 5.2                 | 78.9                | 7.8                          | Inches.<br>0.967                 | T. gr.<br>10.30                                  | T. gr.<br>2.88                                                          | 0.78                                                                |
| 2     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 3     | 80.3                            | 3.6                 | 78.5                | 5.4                          | .955                             | .25                                              | 1.88                                                                    | .85                                                                 |
| 4     | 78.9                            | 2.5                 | 77.6                | 3.8                          | .928                             | 9.99                                             | .28                                                                     | .89                                                                 |
| 5     | 81.8                            | 3.9                 | 79.8                | 5.9                          | .995                             | 10.62                                            | 2.18                                                                    | .83                                                                 |
| 6     | 80.2                            | 4.6                 | 77.9                | 6.9                          | .937                             | .02                                              | .44                                                                     | .80                                                                 |
| 7     | 80.7                            | 4.8                 | 78.3                | 7.2                          | .949                             | .14                                              | .58                                                                     | .80                                                                 |
| 8     | 81.8                            | 4.7                 | 79.4                | 7.1                          | .983                             | .47                                              | .63                                                                     | .80                                                                 |
| 9     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 10    | 76.4                            | 2.1                 | 75.3                | 3.2                          | .862                             | 9.34                                             | 1.01                                                                    | .90                                                                 |
| 11    | 76.7                            | 2.8                 | 75.3                | 4.2                          | .862                             | .32                                              | .34                                                                     | .87                                                                 |
| 12    | 77.1                            | 1.9                 | 76.1                | 2.9                          | .885                             | .57                                              | 0.93                                                                    | .91                                                                 |
| 13    | 76.4                            | 1.3                 | 75.7                | 2.0                          | .873                             | .47                                              | .63                                                                     | .94                                                                 |
| 14    | 78.0                            | 4.0                 | 76.0                | 6.0                          | .882                             | .48                                              | 1.99                                                                    | .83                                                                 |
| 15    | 78.9                            | 3.6                 | 77.1                | 5.4                          | .913                             | .82                                              | .82                                                                     | .84                                                                 |
| 16    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 17    | 76.5                            | 1.9                 | 75.5                | 2.9                          | .868                             | .40                                              | 0.91                                                                    | .91                                                                 |
| 18    | 78.5                            | 2.6                 | 77.2                | 3.9                          | .916                             | .87                                              | 1.30                                                                    | .88                                                                 |
| 19    | 80.2                            | 4.4                 | 78.0                | 6.6                          | .940                             | 10.05                                            | 2.34                                                                    | .81                                                                 |
| 20    | 79.9                            | 4.5                 | 77.6                | 6.8                          | .928                             | 9.93                                             | .38                                                                     | .81                                                                 |
| 21    | 80.0                            | 4.7                 | 77.6                | 7.1                          | .928                             | .93                                              | .49                                                                     | .80                                                                 |
| 22    | 79.7                            | 4.5                 | 77.4                | 6.8                          | .922                             | .87                                              | .37                                                                     | .81                                                                 |
| 23    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 24    | 80.3                            | 5.0                 | 77.8                | 7.5                          | .934                             | .97                                              | .67                                                                     | .79                                                                 |
| 25    | 80.7                            | 4.7                 | 78.3                | 7.1                          | .949                             | 10.14                                            | .54                                                                     | .80                                                                 |
| 26    | 80.9                            | 4.8                 | 78.5                | 7.2                          | .955                             | .21                                              | .59                                                                     | .80                                                                 |
| 27    | 79.8                            | 4.9                 | 77.3                | 7.4                          | .919                             | 9.84                                             | .58                                                                     | .79                                                                 |
| 28    | 80.3                            | 5.0                 | 77.8                | 7.5                          | .934                             | .97                                              | .67                                                                     | .79                                                                 |
| 29    | 80.2                            | 3.6                 | 78.4                | 5.4                          | .952                             | 10.21                                            | 1.89                                                                    | .84                                                                 |
| 30    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                        | Inches.                                                      | Inches. | Inches. | °                             | °                                                              | °    | °     |
| Mid-<br>night. | 29.591                                         | 29.754                                                       | 29.443  | 0.311   | 81.4                          | 81.4                                                           | 78.6 | 5.8   |
| 1              | .575                                           | .741                                                         | .425    | .316    | 81.1                          | 83.8                                                           | 78.6 | 5.2   |
| 2              | .566                                           | .733                                                         | .423    | .310    | 80.6                          | 83.6                                                           | 77.4 | 6.2   |
| 3              | .569                                           | .721                                                         | .418    | .303    | 80.6                          | 83.4                                                           | 76.8 | 6.6   |
| 4              | .548                                           | .711                                                         | .386    | .325    | 80.0                          | 83.6                                                           | 76.6 | 7.0   |
| 5              | .564                                           | .721                                                         | .372    | .349    | 80.1                          | 83.2                                                           | 76.4 | 6.8   |
| 6              | .576                                           | .739                                                         | .352    | .387    | 80.1                          | 83.6                                                           | 77.0 | 6.6   |
| 7              | .590                                           | .747                                                         | .359    | .388    | 80.6                          | 84.3                                                           | 76.8 | 7.5   |
| 8              | .604                                           | .766                                                         | .305    | .461    | 82.0                          | 86.2                                                           | 76.0 | 10.2  |
| 9              | .608                                           | .779                                                         | .323    | .456    | 83.3                          | 89.2                                                           | 76.6 | 12.6  |
| 10             | .607                                           | .772                                                         | .305    | .467    | 84.4                          | 90.8                                                           | 77.0 | 13.8  |
| 11             | .605                                           | .765                                                         | .323    | .442    | 85.5                          | 91.6                                                           | 77.6 | 14.0  |
| Noon.          | .592                                           | .750                                                         | .332    | .418    | 86.6                          | 91.8                                                           | 77.2 | 14.6  |
| 1              | .573                                           | .739                                                         | .311    | .428    | 87.1                          | 93.2                                                           | 77.0 | 16.2  |
| 2              | .550                                           | .712                                                         | .290    | .422    | 87.2                          | 94.9                                                           | 77.4 | 17.5  |
| 3              | .528                                           | .683                                                         | .305    | .378    | 86.9                          | 92.4                                                           | 77.6 | 14.8  |
| 4              | .515                                           | .670                                                         | .310    | .360    | 86.0                          | 91.5                                                           | 77.6 | 13.9  |
| 5              | .520                                           | .675                                                         | .381    | .294    | 86.4                          | 91.2                                                           | 78.8 | 12.4  |
| 6              | .528                                           | .678                                                         | .358    | .320    | 84.8                          | 90.0                                                           | 77.4 | 12.6  |
| 7              | .549                                           | .695                                                         | .374    | .321    | 83.8                          | 89.3                                                           | 77.4 | 11.9  |
| 8              | .569                                           | .742                                                         | .420    | .322    | 83.1                          | 88.0                                                           | 77.8 | 10.2  |
| 9              | .590                                           | .757                                                         | .432    | .325    | 82.6                          | 87.0                                                           | 78.4 | 8.6   |
| 10             | .602                                           | .774                                                         | .446    | .328    | 82.0                          | 86.4                                                           | 77.6 | 8.8   |
| 11             | .600                                           | .770                                                         | .449    | .321    | 81.8                          | 85.0                                                           | 78.4 | 6.6   |

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional Weight of<br>vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 78.8                          | 2.6                 | 77.5                | 3.9                          | 0.925                            | 9.96                                                  | 1.31                                                                | 0.88                                                                |
| 1              | 78.7                          | 2.4                 | 77.5                | 3.6                          | .925                             | .96                                                   | .21                                                                 | .89                                                                 |
| 2              | 78.4                          | 2.2                 | 77.3                | 3.3                          | .919                             | .92                                                   | .09                                                                 | .90                                                                 |
| 3              | 78.4                          | 2.2                 | 77.3                | 3.3                          | .919                             | .92                                                   | .09                                                                 | .90                                                                 |
| 4              | 78.1                          | 1.9                 | 77.1                | 2.9                          | .913                             | .86                                                   | 0.95                                                                | .91                                                                 |
| 5              | 78.0                          | 2.1                 | 76.9                | 3.2                          | .908                             | .80                                                   | 1.04                                                                | .90                                                                 |
| 6              | 78.2                          | 1.9                 | 77.2                | 2.9                          | .916                             | .89                                                   | 0.95                                                                | .91                                                                 |
| 7              | 78.4                          | 2.2                 | 77.3                | 3.3                          | .919                             | .92                                                   | 1.09                                                                | .90                                                                 |
| 8              | 78.9                          | 3.1                 | 77.3                | 4.7                          | .919                             | .88                                                   | .59                                                                 | .86                                                                 |
| 9              | 79.4                          | 3.9                 | 77.4                | 5.9                          | .922                             | .89                                                   | 2.04                                                                | .83                                                                 |
| 10             | 79.8                          | 4.6                 | 77.5                | 6.9                          | .925                             | .90                                                   | .41                                                                 | .80                                                                 |
| 11             | 80.2                          | 5.3                 | 77.5                | 8.0                          | .925                             | .88                                                   | .84                                                                 | .78                                                                 |
|                |                               |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| Noon.          | 80.6                          | 6.0                 | 77.6                | 9.0                          | .928                             | .89                                                   | 3.25                                                                | .75                                                                 |
| 1              | 80.8                          | 6.3                 | 77.6                | 9.5                          | .928                             | .87                                                   | .46                                                                 | .74                                                                 |
| 2              | 80.9                          | 6.3                 | 77.7                | 9.5                          | .931                             | .90                                                   | .47                                                                 | .74                                                                 |
| 3              | 80.7                          | 6.2                 | 77.6                | 9.3                          | .928                             | .89                                                   | .36                                                                 | .75                                                                 |
| 4              | 80.6                          | 5.4                 | 77.9                | 8.1                          | .937                             | 10.00                                                 | 2.91                                                                | .78                                                                 |
| 5              | 80.8                          | 5.6                 | 78.0                | 8.4                          | .940                             | .03                                                   | 3.03                                                                | .77                                                                 |
| 6              | 80.1                          | 4.7                 | 77.7                | 7.1                          | .931                             | 9.96                                                  | 2.50                                                                | .80                                                                 |
| 7              | 79.8                          | 4.0                 | 77.8                | 6.0                          | .934                             | 10.01                                                 | .09                                                                 | .83                                                                 |
| 8              | 79.5                          | 3.6                 | 77.7                | 5.4                          | .931                             | .00                                                   | 1.86                                                                | .84                                                                 |
| 9              | 79.2                          | 3.4                 | 77.5                | 5.1                          | .925                             | 9.94                                                  | .74                                                                 | .85                                                                 |
| 10             | 79.0                          | 3.0                 | 77.5                | 4.5                          | .925                             | .94                                                   | .53                                                                 | .87                                                                 |
| 11             | 78.9                          | 2.9                 | 77.4                | 4.4                          | .922                             | .93                                                   | .53                                                                 | .87                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observation,  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                   |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                              |
| 1     | 132.5                 |                                 | S. & S. E.                        | Scatd. Clouds.                                                                               |
| 2     | Sunday.               | 0.10                            |                                   |                                                                                              |
| 3     |                       | 0.78                            | E.                                | Cloudless till 4 A. M. cloudy afterwards, also rain from 2 to 9 P. M.                        |
| 4     |                       | 0.14                            | N. W. & S.                        | Cloudy, with rain after intervals; also thunder & lightning between 7 & 9 P. M.              |
| 5     |                       | 3.50                            | E. & N. W.                        | Cloudy, with rain from 1 to 4 A. M.                                                          |
| 6     |                       | 0.18                            | Variable.                         | Cloudy; also drizzling at 2 A. M.                                                            |
| 7     | 117.0                 | ...                             | S. W. & W. & S.                   | Scatd. clouds till 4 P. M. cloudless afterwards.                                             |
| 8     |                       | 0.12                            | S. & W.                           | Cloudy; also drizzling at 6 P. M.                                                            |
| 9     | Sunday.               | 0.56                            |                                   |                                                                                              |
| 10    |                       | 0.84                            | S. W. & W.                        | Cloudy; also constantly raining between midnight & 3 P. M.                                   |
| 11    |                       | 0.76                            | S. W. & S.                        | Cloudy & constantly drizzling.                                                               |
| 12    |                       | 1.49                            | S. W.                             | Cloudy & constantly raining.                                                                 |
| 13    |                       | 12.09                           | S. W. & S.                        | Cloudy & constantly raining.                                                                 |
| 14    | 122.0                 | ...                             | S.                                | Cloudy till 5 P. M. cloudless afterwards.                                                    |
| 15    | 115.5                 | ...                             | S. & E.                           | Cloudless till 6 A. M. Scatd. clouds afterwards, also slightly drizzling between 7 & 8 P. M. |
| 16    | Sunday.               | 0.46                            |                                   |                                                                                              |
| 17    |                       | 2.71                            | S.                                | Cloudy, also constantly raining between midnight & 10 A. M.                                  |
| 18    |                       | 1.86                            | S. & S. W.                        | Cloudy; also constantly raining between 1 & 11 A. M.                                         |
| 19    | 125.0                 | ...                             | S.                                | Scatd. clouds.                                                                               |
| 20    | 126.0                 | ...                             | S.                                | Scatd. clouds.                                                                               |
| 21    | 122.0                 | ...                             | S.                                | Cloudy.                                                                                      |
| 22    |                       | 0.18                            | S.                                | Cloudy with slight rain at 5 A. M.                                                           |
| 23    | Sunday.               | ...                             |                                   |                                                                                              |
| 24    |                       | 129.5                           | S.                                | Scatd. ☽i till 5 P. M. cloudy till 8 P. M. cloudless afterwards.                             |
| 25    | 127.4                 | ...                             | S. & S. W.                        | Scatd. ☽i & ☾i.                                                                              |
| 26    | 124.0                 | 0.10                            | S.                                | Scatd. clouds with slight drizzling at 1 & 6 & 8 P. M.                                       |

☽i Cirri, ☽i Cirro strati, ☾i Cumuli, ☽i Cumulo strati, ☽i Nimbi, —i Strati, ☽i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                        |
|-------|-----------------------|---------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------|
|       |                       | Inches.                         |                                   |                                                                                                                   |
| 27    | 121.4                 | 0.16                            | S.                                | Scatd. $\searrow$ i & $\swarrow$ i till 8 P. M. cloudless afterwards, also slightly drizzling between 4 & 6 P. M. |
| 28    | 112.0                 | ..                              | S. & S. E.                        | Cloudless till 5 A. M. Scatd. clouds till 7 P. M. cloudless afterwards also drizzling at 3 & 5 P. M.              |
| 29    |                       | 0.41                            | E. & N. E.                        | Cloudless till 5 A. M. cloudy afterwards, also constantly drizzling between 10 A. M. & 4 P. M.                    |
| 30    | Sunday.               |                                 |                                   |                                                                                                                   |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1861.*

MONTHLY RESULTS.

|                                                               | Inches |
|---------------------------------------------------------------|--------|
| Mean height of the Barometer for the month, ..                | 29.572 |
| Max. height of the Barometer occurred at 9 A. M. on the 19th, | 29.779 |
| Min. height of the Barometer occurred at 2 P. M. on the 13th, | 29.290 |
| <i>Extreme range</i> of the Barometer during the month, ..    | 0.489  |
| Mean of the Daily Max. Pressures,                             | 29.625 |
| Ditto ditto Min. ditto, ..                                    | 29.506 |
| <i>Mean daily range</i> of the Barometer during the month,    | 0.119  |

|                                                              | °    |
|--------------------------------------------------------------|------|
| Mean Dry Bulb Thermometer for the month,                     | 83.3 |
| Max. Temperature occurred at 2 P. M. on the 1st,             | 94.9 |
| Min. Temperature occurred at 8 A. M. on the 10th,            | 76.0 |
| <i>Extreme range</i> of the Temperature during the month,    | 18.9 |
| Mean of the daily Max. Temperature, ..                       | 88.2 |
| Ditto ditto Min. ditto, ..                                   | 79.6 |
| <i>Mean daily range</i> of the Temperature during the month, | 8.6  |
| Mean Wet Bulb Thermometer for the month, ..                  | 79.4 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,   | 3.9  |
| Computed Mean Dew-point for the month, ..                    | 77.4 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,     | 5.9  |

|                                             | Inches |
|---------------------------------------------|--------|
| Mean Elastic force of Vapour for the month, | 0.922  |

|                                                                         | Troy grains |
|-------------------------------------------------------------------------|-------------|
| Mean Weight of Vapour for the month,                                    | 9.89        |
| Additional Weight of Vapour required for complete saturation,           | 2.04        |
| Mean degree of humidity for the month, complete saturation being unity, | 0.83        |

|                                                    | Inches     |
|----------------------------------------------------|------------|
| Rained 20 days, Max. fall of rain during 24 hours, | 12.09      |
| Total amount of rain during the month,             | 26.44      |
| Prevailing direction of the Wind, ..               | S. & S. W. |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1861.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. |              |          |       |          | 2  |          |       |          | 16 | 2        | 2     | 1        | 1  | 1        |       |          | 3     |          | 1       |
| 1         |              |          |       |          | 3  | 1        | 2     | 1        | 16 | 3        | 2     | 1        | 1  | 1        |       |          | 1     |          |         |
| 2         |              |          |       |          | 3  | 1        | 2     | 1        | 16 | 4        | 2     | 1        | 1  | 1        |       |          | 1     |          |         |
| 3         |              |          |       |          | 3  | 1        | 1     |          | 14 | 2        | 3     | 1        |    |          | 1     |          | 1     |          | 2       |
| 4         |              |          |       |          | 3  | 1        | 1     |          | 10 | 2        | 3     | 2        | 1  | 1        |       |          | 1     |          | 7       |
| 5         |              |          |       |          | 3  |          | 2     |          | 14 | 3        | 4     | 1        | 1  | 1        | 1     |          |       |          |         |
| 6         |              |          |       |          | 3  |          | 3     |          | 11 | 1        | 7     | 4        |    |          | 1     |          |       |          |         |
| 7         | 1            |          |       |          | 3  |          | 2     |          | 10 | 1        | 8     | 4        | 1  |          | 1     |          |       |          |         |
| 8         | 1            |          | 1     |          | 4  |          | 2     |          | 8  | 1        | 6     | 3        | 1  |          | 1     |          |       |          | 1       |
| 9         | 1            |          | 1     |          | 2  |          | 2     |          | 9  | 1        | 8     | 4        | 1  |          | 1     |          |       |          |         |
| 10        | 1            |          |       |          | 5  | 1        | 1     |          | 8  | 1        | 7     | 4        | 1  |          | 2     | 1        |       |          |         |
| 11        | 1            |          |       |          |    |          | 3     |          | 10 | 1        | 6     | 3        | 3  | 1        | 2     | 1        |       |          |         |
|           | 1            |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
|           | 1            |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Noon.     |              |          |       |          | 2  |          |       |          | 12 |          | 3     | 2        | 5  | 1        | 2     | 1        |       |          |         |
| 1         |              |          |       |          | 1  |          | 1     |          | 12 | 2        | 4     | 2        | 5  | 2        | 1     | 1        |       |          |         |
| 2         |              | 1        |       |          | 2  | 1        |       |          | 11 | 1        | 4     |          | 6  | 1        | 1     |          |       |          |         |
| 3         |              | 1        |       |          | 1  |          | 2     |          | 12 | 2        | 4     | 1        | 3  |          | 2     |          |       |          |         |
| 4         |              | 1        |       |          | 1  | 1        |       |          | 13 | 1        | 2     |          | 2  | 2        | 3     |          | 1     |          | 2       |
| 5         |              | 1        |       |          | 1  | 1        |       |          | 12 |          | 4     | 3        | 2  |          |       |          | 2     |          | 3       |
| 6         |              |          | 1     |          | 1  | 1        | 2     | 1        | 13 | 3        | 5     | 2        | 1  |          |       |          | 2     |          |         |
| 7         |              |          | 1     |          | 1  | 1        | 1     |          | 16 | 2        | 4     | 2        |    |          |       |          | 2     |          |         |
| 8         |              |          |       |          | 2  | 2        | 1     |          | 17 | 3        | 3     | 2        |    |          |       |          | 1     |          | 1       |
| 9         |              |          | 1     |          | 3  | 2        |       |          | 17 |          | 3     | 1        |    |          | 1     |          |       |          |         |
| 10        |              |          | 1     |          | 3  | 1        |       |          | 17 |          | 3     | 2        |    |          | 1     |          |       |          |         |
| 11        |              |          | 1     |          | 3  | 1        |       |          | 17 |          | 3     | 2        |    |          | 1     |          |       |          |         |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                        | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.560                                         | 29.598                                    | 29.499  | 0.099   | 83.5                          | 90.4                                          | 81.0 | 9.4   |
| 2     | .489                                           | .516                                      | .407    | .139    | 82.1                          | 85.8                                          | 80.0 | 5.8   |
| 3     | .441                                           | .504                                      | .391    | .113    | 80.2                          | 80.8                                          | 78.8 | 2.0   |
| 4     | .495                                           | .555                                      | .441    | .114    | 82.3                          | 85.6                                          | 79.6 | 6.0   |
| 5     | .576                                           | .620                                      | .526    | .094    | 83.5                          | 86.2                                          | 80.0 | 6.2   |
| 6     | .589                                           | .632                                      | .539    | .093    | 84.5                          | 87.6                                          | 82.1 | 5.5   |
| 7     | Sunday.                                        |                                           |         |         |                               |                                               |      |       |
| 8     | .573                                           | .624                                      | .515    | .109    | 85.7                          | 91.6                                          | 81.4 | 10.2  |
| 9     | .569                                           | .617                                      | .533    | .084    | 85.0                          | 89.4                                          | 82.2 | 7.2   |
| 10    | .592                                           | .637                                      | .529    | .108    | 84.6                          | 89.2                                          | 81.4 | 7.8   |
| 11    | .579                                           | .629                                      | .504    | .125    | 84.7                          | 91.6                                          | 81.3 | 10.3  |
| 12    | .618                                           | .655                                      | .584    | .071    | 82.6                          | 88.3                                          | 79.0 | 9.3   |
| 13    | .639                                           | .678                                      | .572    | .106    | 82.1                          | 86.7                                          | 80.1 | 6.6   |
| 14    | Sunday.                                        |                                           |         |         |                               |                                               |      |       |
| 15    | .574                                           | .631                                      | .482    | .149    | 83.5                          | 88.0                                          | 79.7 | 8.3   |
| 16    | .466                                           | .542                                      | .384    | .158    | 82.2                          | 87.0                                          | 79.4 | 7.6   |
| 17    | .354                                           | .422                                      | .259    | .163    | 82.9                          | 87.2                                          | 80.0 | 7.2   |
| 18    | .382                                           | .456                                      | .316    | .140    | 81.4                          | 85.0                                          | 78.8 | 6.2   |
| 19    | .452                                           | .511                                      | .409    | .102    | 81.8                          | 85.6                                          | 79.4 | 6.2   |
| 20    | .515                                           | .567                                      | .465    | .102    | 82.3                          | 86.8                                          | 79.8 | 7.0   |
| 21    | Sunday.                                        |                                           |         |         |                               |                                               |      |       |
| 22    | .472                                           | .534                                      | .407    | .127    | 83.3                          | 89.4                                          | 80.1 | 9.3   |
| 23    | .486                                           | .522                                      | .429    | .093    | 84.2                          | 88.6                                          | 80.0 | 8.6   |
| 24    | .517                                           | .587                                      | .470    | .117    | 82.8                          | 84.6                                          | 81.2 | 3.4   |
| 25    | .570                                           | .613                                      | .526    | .087    | 84.1                          | 87.7                                          | 81.2 | 6.5   |
| 26    | .591                                           | .631                                      | .544    | .087    | 82.6                          | 84.8                                          | 80.2 | 4.6   |
| 27    | .596                                           | .647                                      | .538    | .109    | 84.0                          | 88.3                                          | 81.2 | 7.1   |
| 28    | Sunday.                                        |                                           |         |         |                               |                                               |      |       |
| 29    | .592                                           | .633                                      | .549    | .084    | 83.8                          | 87.6                                          | 79.8 | 7.8   |
| 30    | .589                                           | .617                                      | .543    | .104    | 80.9                          | 83.2                                          | 78.4 | 4.8   |
| 31    | .539                                           | .597                                      | .447    | .150    | 83.7                          | 89.0                                          | 79.0 | 10.0  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of Air. | Additional Weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | °                          | °                   | °                   | °                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | 80.3                       | 3.2                 | 78.7                | 4.8                       | 0.961                         | 10.31                                         | 1.69                                                          | 0.86                                                      |
| 2     | 79.8                       | 2.3                 | 78.6                | 3.5                       | .958                          | .30                                           | .21                                                           | .90                                                       |
| 3     | 77.9                       | 2.3                 | 76.7                | 3.5                       | .902                          | 9.72                                          | .16                                                           | .89                                                       |
| 4     | 79.1                       | 3.2                 | 77.5                | 4.8                       | .925                          | .94                                           | .64                                                           | .86                                                       |
| 5     | 80.4                       | 3.1                 | 78.8                | 4.7                       | .964                          | 10.34                                         | .66                                                           | .86                                                       |
| 6     | 80.8                       | 3.7                 | 78.9                | 5.6                       | .967                          | .34                                           | 2.01                                                          | .84                                                       |
| 7     | Sunday.                    |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 8     | 81.0                       | 4.7                 | 78.6                | 7.1                       | .958                          | .23                                           | .57                                                           | .80                                                       |
| 9     | 80.7                       | 4.3                 | 78.5                | 6.5                       | .955                          | .21                                           | .32                                                           | .82                                                       |
| 10    | 80.7                       | 3.9                 | 78.7                | 5.9                       | .961                          | .29                                           | .10                                                           | .83                                                       |
| 11    | 80.6                       | 4.1                 | 78.5                | 6.2                       | .955                          | .23                                           | .19                                                           | .82                                                       |
| 12    | 79.6                       | 3.0                 | 78.1                | 4.5                       | .943                          | .12                                           | 1.56                                                          | .87                                                       |
| 13    | 79.3                       | 2.8                 | 77.9                | 4.2                       | .937                          | .08                                           | .43                                                           | .88                                                       |
| 14    | Sunday.                    |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 15    | 79.8                       | 3.7                 | 77.9                | 5.6                       | .937                          | .04                                           | .96                                                           | .84                                                       |
| 16    | 79.3                       | 2.9                 | 77.8                | 4.4                       | .934                          | .05                                           | .49                                                           | .87                                                       |
| 17    | 79.7                       | 3.2                 | 78.1                | 4.8                       | .943                          | .12                                           | .67                                                           | .86                                                       |
| 18    | 79.3                       | 2.1                 | 78.2                | 3.2                       | .946                          | .19                                           | .08                                                           | .90                                                       |
| 19    | 79.3                       | 2.5                 | 78.0                | 3.8                       | .940                          | .11                                           | .29                                                           | .89                                                       |
| 20    | 78.9                       | 3.4                 | 77.2                | 5.1                       | .916                          | 9.85                                          | .73                                                           | .85                                                       |
| 21    | Sunday.                    |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 22    | 79.8                       | 3.5                 | 78.0                | 5.3                       | .940                          | 10.09                                         | .84                                                           | .85                                                       |
| 23    | 80.3                       | 3.9                 | 78.3                | 5.9                       | .949                          | .16                                           | 2.03                                                          | .83                                                       |
| 24    | 80.0                       | 2.8                 | 78.6                | 4.2                       | .958                          | .30                                           | 1.45                                                          | .88                                                       |
| 25    | 80.1                       | 4.0                 | 78.1                | 6.0                       | .943                          | .10                                           | 2.11                                                          | .83                                                       |
| 26    | 79.5                       | 3.1                 | 77.9                | 4.7                       | .937                          | .06                                           | 1.62                                                          | .86                                                       |
| 27    | 79.7                       | 4.3                 | 77.5                | 6.5                       | .925                          | 9.90                                          | 2.27                                                          | .81                                                       |
| 28    | Sunday.                    |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 29    | 80.2                       | 3.6                 | 78.4                | 5.4                       | .952                          | 10.21                                         | 1.89                                                          | .84                                                       |
| 30    | 78.3                       | 2.6                 | 77.0                | 3.9                       | .910                          | 9.81                                          | .29                                                           | .88                                                       |
| 31    | 80.0                       | 3.7                 | 78.1                | 5.6                       | .943                          | 10.10                                         | .97                                                           | .84                                                       |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.546                                          | 29.631                                                       | 29.341  | 0.290   | 81.6                          | 83.3                                                                | 79.2 | 4.1   |
| 1              | .538                                            | .648                                                         | .333    | .315    | 81.3                          | 83.0                                                                | 79.2 | 3.8   |
| 2              | .527                                            | .640                                                         | .325    | .315    | 81.1                          | 83.0                                                                | 79.2 | 3.8   |
| 3              | .514                                            | .638                                                         | .316    | .322    | 80.9                          | 83.0                                                                | 79.2 | 3.8   |
| 4              | .524                                            | .632                                                         | .370    | .262    | 80.9                          | 82.6                                                                | 79.2 | 3.4   |
| 5              | .517                                            | .643                                                         | .321    | .322    | 80.6                          | 82.4                                                                | 79.2 | 3.2   |
| 6              | .534                                            | .649                                                         | .353    | .296    | 80.7                          | 82.4                                                                | 78.8 | 3.6   |
| 7              | .550                                            | .658                                                         | .388    | .270    | 81.3                          | 83.3                                                                | 79.2 | 4.1   |
| 8              | .576                                            | .672                                                         | .394    | .278    | 82.9                          | 85.4                                                                | 78.8 | 6.6   |
| 9              | .573                                            | .673                                                         | .399    | .274    | 84.1                          | 86.6                                                                | 79.9 | 6.7   |
| 10             | .573                                            | .678                                                         | .404    | .274    | 85.0                          | 88.0                                                                | 80.8 | 7.2   |
| 11             | .567                                            | .670                                                         | .382    | .288    | 85.6                          | 90.2                                                                | 80.6 | 9.6   |
| Noon.          | .552                                            | .650                                                         | .374    | .276    | 85.4                          | 90.4                                                                | 80.1 | 10.3  |
| 1              | .537                                            | .639                                                         | .353    | .286    | 85.6                          | 90.2                                                                | 79.8 | 10.4  |
| 2              | .517                                            | .625                                                         | .335    | .290    | 85.7                          | 91.0                                                                | 79.0 | 12.0  |
| 3              | .500                                            | .609                                                         | .305    | .304    | 85.9                          | 91.6                                                                | 80.7 | 10.9  |
| 4              | .483                                            | .589                                                         | .263    | .326    | 85.5                          | 89.6                                                                | 80.6 | 9.0   |
| 5              | .482                                            | .591                                                         | .259    | .332    | 84.8                          | 88.6                                                                | 79.4 | 9.2   |
| 6              | .495                                            | .601                                                         | .285    | .316    | 83.8                          | 88.4                                                                | 79.2 | 9.2   |
| 7              | .510                                            | .614                                                         | .296    | .318    | 82.9                          | 86.3                                                                | 78.4 | 7.9   |
| 8              | .529                                            | .643                                                         | .313    | .330    | 82.5                          | 85.2                                                                | 79.1 | 6.1   |
| 9              | .547                                            | .662                                                         | .334    | .328    | 82.3                          | 84.2                                                                | 79.6 | 4.6   |
| 10             | .558                                            | .673                                                         | .351    | .322    | 82.0                          | 83.9                                                                | 78.8 | 5.1   |
| 11             | .559                                            | .669                                                         | .350    | .319    | 81.7                          | 83.8                                                                | 78.8 | 5.0   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 79.2                            | 2.4                 | 78.0                | 3.6                          | 0.940                            | 10.11                                                 | 1.23                                                                     | 0.89                                                                 |
| 1              | 79.1                            | 2.2                 | 78.0                | 3.3                          | .940                             | .13                                                   | .11                                                                      | .90                                                                  |
| 2              | 79.0                            | 2.1                 | 77.9                | 3.2                          | .937                             | .10                                                   | .07                                                                      | .90                                                                  |
| 3              | 78.9                            | 2.0                 | 77.9                | 3.0                          | .937                             | .10                                                   | .00                                                                      | .91                                                                  |
| 4              | 78.9                            | 2.0                 | 77.9                | 3.0                          | .937                             | .10                                                   | .00                                                                      | .91                                                                  |
| 5              | 78.7                            | 1.9                 | 77.7                | 2.9                          | .931                             | .04                                                   | 0.97                                                                     | .91                                                                  |
| 6              | 78.7                            | 2.0                 | 77.7                | 3.0                          | .931                             | .04                                                   | 1.00                                                                     | .91                                                                  |
| 7              | 79.1                            | 2.2                 | 78.0                | 3.3                          | .940                             | .13                                                   | .11                                                                      | .90                                                                  |
| 8              | 79.7                            | 3.2                 | 78.1                | 4.8                          | .943                             | .12                                                   | .67                                                                      | .86                                                                  |
| 9              | 80.3                            | 3.8                 | 78.4                | 5.7                          | .952                             | .19                                                   | 2.02                                                                     | .84                                                                  |
| 10             | 80.7                            | 4.3                 | 78.5                | 6.5                          | .955                             | .12                                                   | .32                                                                      | .82                                                                  |
| 11             | 80.9                            | 4.7                 | 78.5                | 7.1                          | .955                             | .21                                                   | .55                                                                      | .80                                                                  |
| Noon.          | 80.9                            | 4.5                 | 78.6                | 6.8                          | .958                             | .23                                                   | .45                                                                      | .81                                                                  |
| 1              | 80.6                            | 5.0                 | 78.1                | 7.5                          | .943                             | .06                                                   | .70                                                                      | .79                                                                  |
| 2              | 80.8                            | 4.9                 | 78.3                | 7.4                          | .949                             | .14                                                   | .66                                                                      | .79                                                                  |
| 3              | 81.1                            | 4.8                 | 78.7                | 7.2                          | .961                             | .26                                                   | .61                                                                      | .80                                                                  |
| 4              | 81.0                            | 4.5                 | 78.7                | 6.8                          | .961                             | .26                                                   | .46                                                                      | .81                                                                  |
| 5              | 80.5                            | 4.3                 | 78.3                | 6.5                          | .949                             | .14                                                   | .32                                                                      | .81                                                                  |
| 6              | 80.0                            | 3.8                 | 78.1                | 5.7                          | .943                             | .10                                                   | .00                                                                      | .84                                                                  |
| 7              | 79.6                            | 3.3                 | 77.9                | 5.0                          | .937                             | .06                                                   | 1.73                                                                     | .85                                                                  |
| 8              | 79.4                            | 3.1                 | 77.8                | 4.7                          | .934                             | .03                                                   | .61                                                                      | .86                                                                  |
| 9              | 79.5                            | 2.8                 | 78.1                | 4.2                          | .943                             | .14                                                   | .44                                                                      | .88                                                                  |
| 10             | 79.3                            | 2.7                 | 77.9                | 4.1                          | .937                             | .08                                                   | .39                                                                      | .88                                                                  |
| 11             | 79.3                            | 2.4                 | 78.1                | 3.6                          | .943                             | .14                                                   | .23                                                                      | .89                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                    |
|-------|-----------------------|---------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                                               |
| 1     | ...                   | 0.54                            | E. & S.                           | Cloudy; also drizzling between Noon & 2 P. M.                                                                 |
| 2     | ..                    | 0.33                            | S. E. & S.                        | Cloudy & raining after intervals.                                                                             |
| 3     | ...                   | 2.40                            | S. W. & S. E.                     | Cloudy & constantly raining.                                                                                  |
| 4     | ...                   | 0.12                            | S. W. & S.                        | Cloudy & drizzling between 9 A. M. & Noon & between 10 & 11 P. M.                                             |
| 5     | ...                   | 0.39                            | S. & S. W.                        | Cloudy & constantly drizzling before sunrise.                                                                 |
| 6     | ...                   | ...                             | S. & S. W.                        | Cloudy.                                                                                                       |
| 7     | <i>Sunday.</i>        | ..                              |                                   |                                                                                                               |
| 8     | 129.4                 | ...                             | S.                                | Scatd. clouds.                                                                                                |
| 9     | 122.2                 | ...                             | S. & S. E.                        | Cloudless till 5 A. M. cloudy till 8 P. M. cloudless afterwards; also slightly drizzling between 9 & 10 A. M. |
| 10    | 118.5                 | 0.10                            | S.                                | Scatd. clouds till 2 P. M. cloudy till 7 P. M. cloudless afterwards; also slightly drizzling at 4 P. M.       |
| 11    | 136.0                 | 0.12                            | S.                                | Cloudless till 4 A. M. Scatd. clouds afterwards; also drizzling at 4 P. M.                                    |
| 12    | ...                   | 0.56                            | E. & S. E. & N. E.                | Cloudy; also raining between 1 & 7 P. M.                                                                      |
| 13    | ...                   | 0.20                            | E.                                | Scatd. clouds till 9 P. M. cloudless afterwards; also drizzling between 11 A. M. & 1 P. M.                    |
| 14    | <i>Sunday.</i>        | 0.18                            |                                   |                                                                                                               |
| 15    | ...                   | 0.12                            | E.                                | Cloudless till 3 A. M. cloudy afterwards; also occasionally drizzling between Noon & 7 P. M.                  |
| 16    | ...                   | 0.63                            | E.                                | Cloudless till 4 A. M. cloudy afterwards; also occasionally drizzling.                                        |
| 17    | ...                   | 0.34                            | E.                                | Cloudy; also occasionally drizzling.                                                                          |
| 18    | ...                   | 1.82                            | S. & S. E.                        | Cloudy; also raining after intervals.                                                                         |
| 19    | ...                   | 0.42                            | S. & E.                           | Cloudy; also constantly raining between Midnight & Noon.                                                      |
| 20    | ...                   | 0.18                            | S. W. & S.                        | Cloudy; also drizzling at 6 P. M.                                                                             |
| 21    | <i>Sunday.</i>        | 0.97                            |                                   |                                                                                                               |
| 22    | ...                   | 0.08                            | E.                                | Cloudy; with rain between 6 & 7 A. M.                                                                         |
| 23    | ...                   | ...                             | E. & S. E. & S.                   | Scatd. clouds till 8 A. M. Scatd. clouds afterwards; also drizzling at Noon & 2 P. M.                         |
| 24    | ...                   | 0.10                            | S. & S. W.                        | Cloudy; also slightly drizzling at 1 & 11 A. M.                                                               |
| 25    | ...                   | ...                             | S.                                | Cloudy; also slightly drizzling at 6 P. M.                                                                    |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1861.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                 |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------|
| 26    | ...                   |                                 | S.                                | Cloudy; also occasionally drizzling.                       |
| 27    | ...                   |                                 | S. & S. W.                        | Scatd. $\searrow$ i till 8 A. M. Scatd. clouds afterwards. |
| 28    | Sunday.               | 0.90                            |                                   |                                                            |
| 29    | ...                   | 0.17                            | S. W. & S.                        | Cloudy, with rain at 7 P. M.                               |
| 30    | ...                   | 0.26                            | S. W. & W. & S.                   | Cloudy, with constant drizzling between 5 & 9 P. M.        |
| 31    | ...                   | ...                             | S. W. & S. & W.                   | Cloudy.                                                    |

$\searrow$ i Cirri,  $\searrow$ i Cirro strati,  $\circ$ i Cumuli,  $\sim$ i Cumulo strati,  $\searrow$ i Nimbi, —i Strati  
 $\searrow$  i Cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1861.*

MONTHLY RESULTS.

|                                                                |    |    | Inches |
|----------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                    | .. | .. | 29.534 |
| Max. height of the Barometer occurred at 10 A. M. on the 13th, | .. | .. | 29.678 |
| Min. height of the Barometer occurred at 5 P. M. on the 17th,  | .. | .. | 29.259 |
| <i>Extreme range</i> of the Barometer during the month,        | .. | .. | 0.419  |
| Mean of the daily Max. Pressures,                              | .. | .. | 29.586 |
| Ditto ditto Min. ditto,                                        | .. | .. | 29.474 |
| <i>Mean daily range</i> of the Barometer during the month,     | .. | .. | 0.112  |

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|                                                              |    |    | o    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 83.1 |
| Max. Temperature occurred at 3 P. M. on the 8th and 11th,    | .. | .. | 91.6 |
| Min. Temperature occurred at 7 P. M. on the 30th,            | .. | .. | 78.4 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 13 2 |
| Mean of the daily Max. Temperature,                          | .. | .. | 87.3 |
| Ditto ditto Min. ditto,                                      | .. | .. | 80.2 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 7.1  |

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|                                                            |    |    | o      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 79.8   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 3.3    |
| Computed Mean Dew-point for the month,                     | .. | .. | 78.1   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 5.0    |
|                                                            |    |    | Inches |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.943  |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 10.12        |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 1.74         |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.85         |

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|                                                    |    |    | Inches          |
|----------------------------------------------------|----|----|-----------------|
| Rained 26 days, Max. fall of rain during 24 hours, | .. | .. | 2.40            |
| Total amount of rain during the month,             | .. | .. | 10.93           |
| Prevailing direction of the Wind,                  | .. | .. | S. & E. & S. W. |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of July, 1861.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N. | Rain on. | N. E. | Rain on. | E.           | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|----|----------|-------|----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           |    |          |       |          |              |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
|           |    |          |       |          | No. of days. |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. |    |          |       |          | 4            |          | 3     | 1        | 16 |          | 1     | 1        |    |          |       |          | 1     |          | 2       |
| 1         |    |          |       |          | 5            | 1        | 3     | 2        | 17 | 1        | 1     | 1        |    |          |       |          | 1     |          |         |
| 2         |    |          |       |          | 5            | 1        | 4     | 2        | 16 | 2        | 1     | 1        |    |          |       |          | 1     |          |         |
| 3         |    |          |       |          | 5            |          | 4     | 2        | 14 | 1        | 1     | 1        |    |          |       |          |       |          | 3       |
| 4         |    |          |       |          | 7            |          | 3     |          | 11 |          | 1     | 1        |    |          |       |          |       |          | 5       |
| 5         |    |          |       |          | 8            | 1        | 3     |          | 11 | 1        | 2     |          | 1  |          |       |          |       |          | 2       |
| 6         |    | 1        |       |          | 5            | 1        | 5     | 1        | 11 |          | 4     | 1        | 1  |          |       |          |       |          |         |
| 7         |    |          |       |          | 7            | 1        | 3     | 1        | 10 |          | 6     | 2        | 1  |          |       |          |       |          |         |
| 8         |    |          | 1     |          | 6            | 1        | 3     |          | 7  |          | 7     |          |    |          |       |          |       |          | 3       |
| 9         |    |          | 1     |          | 4            |          | 4     |          | 11 | 1        | 6     |          | 1  |          |       |          |       |          |         |
| 10        |    |          | 1     |          | 4            | 1        | 3     | 1        | 11 | 1        | 8     | 1        |    |          |       |          |       |          |         |
| 11        |    |          |       |          | 5            | 1        | 3     | 1        | 9  | 1        | 9     | 2        | 1  |          |       |          |       |          |         |
|           |    |          |       |          |              |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Noon.     |    |          |       |          | 4            | 2        | 4     | 3        | 10 | 3        | 6     | 1        | 3  | 1        |       |          |       |          |         |
| 1         |    |          |       |          | 4            | 2        | 6     | 2        | 8  | 1        | 6     |          | 3  | 1        |       |          |       |          |         |
| 2         |    | 1        |       |          | 4            | 1        | 4     | 3        | 8  | 1        | 8     |          | 2  | 1        |       |          |       |          |         |
| 3         |    |          |       |          | 7            | 1        | 2     |          | 6  |          | 11    | 1        | 1  |          |       |          |       |          |         |
| 4         |    | 1        |       |          | 5            | 2        | 2     |          | 10 | 3        | 5     |          | 1  |          |       |          |       |          | 3       |
| 5         |    | 2        |       |          | 5            | 1        | 1     |          | 12 |          | 4     | 1        | 2  |          |       |          |       |          | 1       |
| 6         |    | 2        |       |          | 5            | 1        | 1     |          | 13 | 2        | 5     |          | 1  |          |       |          |       |          |         |
| 7         |    | 1        | 1     |          | 4            |          | 3     | 2        | 14 | 1        | 4     | 1        |    |          |       |          |       |          | 1       |
| 8         |    | 1        |       |          | 4            | 1        | 3     |          | 15 |          | 4     | 1        |    |          |       |          |       |          |         |
| 9         |    | 1        |       |          | 4            |          | 3     | 1        | 15 | 1        | 4     | 2        |    |          |       |          |       |          |         |
| 10        |    |          |       |          | 7            |          | 2     | 1        | 12 |          | 5     | 1        |    |          |       |          |       |          | 1       |
| 11        |    |          |       |          | 6            |          | 2     | 1        | 11 |          | 6     | 1        |    |          |       |          |       |          | 2       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.565                                          | 29.624                                    | 29.518  | 0.106   | 84.1                          | 91.4                                          | 80.2 | 11.2  |
| 2     | .640                                            | .710                                      | .586    | .124    | 82.8                          | 88.4                                          | 80.0 | 8.4   |
| 3     | .691                                            | .736                                      | .642    | .094    | 83.6                          | 88.0                                          | 79.8 | 8.2   |
| 4     | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 5     | .747                                            | .795                                      | .689    | .106    | 85.3                          | 91.7                                          | 80.6 | 11.1  |
| 6     | .718                                            | .778                                      | .615    | .163    | 85.8                          | 91.8                                          | 81.8 | 10.0  |
| 7     | .685                                            | .739                                      | .632    | .107    | 79.5                          | 83.8                                          | 77.2 | 6.6   |
| 8     | .698                                            | .757                                      | .641    | .116    | 80.3                          | 83.9                                          | 77.8 | 6.1   |
| 9     | .702                                            | .747                                      | .645    | .102    | 79.8                          | 86.2                                          | 76.0 | 10.2  |
| 10    | .731                                            | .786                                      | .668    | .118    | 83.2                          | 90.2                                          | 79.0 | 11.2  |
| 11    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 12    | .660                                            | .721                                      | .585    | .136    | 83.9                          | 90.9                                          | 80.4 | 10.5  |
| 13    | .606                                            | .654                                      | .537    | .117    | 84.0                          | 89.2                                          | 80.4 | 8.8   |
| 14    | .570                                            | .610                                      | .512    | .098    | 85.0                          | 90.4                                          | 80.8 | 9.6   |
| 15    | .564                                            | .605                                      | .513    | .092    | 84.5                          | 90.6                                          | 79.8 | 10.8  |
| 16    | .547                                            | .595                                      | .482    | .113    | 83.6                          | 87.2                                          | 80.8 | 6.4   |
| 17    | .495                                            | .553                                      | .401    | .152    | 82.8                          | 88.0                                          | 79.6 | 8.4   |
| 18    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 19    | .461                                            | .525                                      | .393    | .132    | 83.6                          | 88.8                                          | 80.0 | 8.8   |
| 20    | .428                                            | .484                                      | .357    | .127    | 82.7                          | 88.4                                          | 79.9 | 8.5   |
| 21    | .506                                            | .597                                      | .434    | .163    | 80.5                          | 83.6                                          | 79.0 | 4.6   |
| 22    | .610                                            | .649                                      | .575    | .074    | 80.5                          | 85.0                                          | 77.9 | 7.1   |
| 23    | .589                                            | .643                                      | .521    | .122    | 82.7                          | 86.2                                          | 80.4 | 5.8   |
| 24    | .557                                            | .645                                      | .498    | .147    | 82.6                          | 86.8                                          | 80.4 | 6.4   |
| 25    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 26    | .625                                            | .679                                      | .557    | .122    | 83.2                          | 87.4                                          | 79.9 | 7.5   |
| 27    | .601                                            | .655                                      | .533    | .122    | 82.8                          | 88.4                                          | 80.5 | 7.9   |
| 28    | .582                                            | .634                                      | .507    | .127    | 83.7                          | 88.0                                          | 80.4 | 7.6   |
| 29    | .560                                            | .617                                      | .489    | .128    | 83.3                          | 89.8                                          | 80.1 | 9.7   |
| 30    | .515                                            | .567                                      | .457    | .110    | 82.6                          | 87.2                                          | 80.2 | 7.0   |
| 31    | .450                                            | .522                                      | .355    | .167    | 83.3                          | 89.2                                          | 78.2 | 11.0  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of Air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 80.8                            | 3.3                 | 79.1                | 5.0                          | 0.973                            | 10.42                                            | 1.79                                                                    | 0.85                                                              |
| 2     | 79.7                            | 3.1                 | 78.1                | 4.7                          | .943                             | .12                                              | .63                                                                     | .86                                                               |
| 3     | 80.1                            | 3.5                 | 78.3                | 5.3                          | .949                             | .18                                              | .85                                                                     | .85                                                               |
| 4     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 5     | 80.3                            | 5.0                 | 77.8                | 7.5                          | .934                             | 9.97                                             | 2.67                                                                    | .79                                                               |
| 6     | 80.6                            | 5.2                 | 78.0                | 7.8                          | .940                             | 10.03                                            | .80                                                                     | .78                                                               |
| 7     | 77.4                            | 2.1                 | 76.3                | 3.2                          | .890                             | 9.63                                             | 1.03                                                                    | .90                                                               |
| 8     | 77.7                            | 2.6                 | 76.4                | 3.9                          | .893                             | .64                                              | .27                                                                     | .88                                                               |
| 9     | 77.4                            | 2.4                 | 76.2                | 3.6                          | .887                             | .58                                              | .17                                                                     | .89                                                               |
| 10    | 79.6                            | 3.6                 | 77.8                | 5.4                          | .934                             | 10.03                                            | .86                                                                     | .84                                                               |
| 11    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 12    | 80.2                            | 3.7                 | 78.3                | 5.6                          | .949                             | .16                                              | .97                                                                     | .84                                                               |
| 13    | 80.6                            | 3.4                 | 78.9                | 5.1                          | .967                             | .37                                              | .80                                                                     | .85                                                               |
| 14    | 80.5                            | 4.5                 | 78.2                | 6.8                          | .946                             | .11                                              | 2.42                                                                    | .81                                                               |
| 15    | 80.3                            | 4.2                 | 78.2                | 6.3                          | .946                             | .13                                              | .22                                                                     | .82                                                               |
| 16    | 80.0                            | 3.6                 | 78.2                | 5.4                          | .946                             | .15                                              | 1.88                                                                    | .84                                                               |
| 17    | 79.4                            | 3.4                 | 77.7                | 5.1                          | .931                             | .00                                              | .75                                                                     | .85                                                               |
| 18    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 19    | 80.1                            | 3.5                 | 78.3                | 5.3                          | .949                             | .18                                              | .85                                                                     | .85                                                               |
| 20    | 79.7                            | 3.0                 | 78.2                | 4.5                          | .946                             | .15                                              | .57                                                                     | .87                                                               |
| 21    | 78.6                            | 1.9                 | 77.6                | 2.9                          | .928                             | .01                                              | 0.97                                                                    | .91                                                               |
| 22    | 78.6                            | 1.9                 | 77.6                | 2.9                          | .928                             | .01                                              | .97                                                                     | .91                                                               |
| 23    | 80.4                            | 2.3                 | 79.2                | 3.5                          | .976                             | .48                                              | 1.24                                                                    | .89                                                               |
| 24    | 79.7                            | 2.9                 | 78.2                | 4.4                          | .946                             | .17                                              | .51                                                                     | .87                                                               |
| 25    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 26    | 79.8                            | 3.4                 | 78.1                | 5.1                          | .943                             | .12                                              | .77                                                                     | .85                                                               |
| 27    | 80.1                            | 2.7                 | 78.7                | 4.1                          | .961                             | .33                                              | .42                                                                     | .88                                                               |
| 28    | 80.8                            | 2.9                 | 79.3                | 4.4                          | .979                             | .51                                              | .56                                                                     | .87                                                               |
| 29    | 80.3                            | 3.0                 | 78.8                | 4.5                          | .964                             | .34                                              | .59                                                                     | .87                                                               |
| 30    | 80.0                            | 2.6                 | 78.7                | 3.9                          | .961                             | .33                                              | .35                                                                     | .88                                                               |
| 31    | 79.5                            | 3.8                 | 77.6                | 5.7                          | .928                             | 9.95                                             | .98                                                                     | .83                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                        | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.620                                         | 29.774                                                       | 29.457  | 0.317   | 81.2                          | 83.8                                                                | 77.1 | 6.7   |
| 1              | .608                                           | .743                                                         | .437    | .306    | 81.0                          | 83.8                                                                | 76.0 | 7.8   |
| 2              | .596                                           | .744                                                         | .416    | .328    | 80.8                          | 82.6                                                                | 76.6 | 6.0   |
| 3              | .585                                           | .734                                                         | .412    | .322    | 80.6                          | 82.2                                                                | 76.8 | 5.4   |
| 4              | .592                                           | .728                                                         | .434    | .294    | 80.4                          | 82.0                                                                | 76.8 | 5.2   |
| 5              | .590                                           | .745                                                         | .417    | .328    | 80.0                          | 81.8                                                                | 77.0 | 4.8   |
| 6              | .604                                           | .763                                                         | .431    | .332    | 80.0                          | 81.8                                                                | 77.0 | 4.8   |
| 7              | .619                                           | .774                                                         | .450    | .324    | 80.7                          | 83.0                                                                | 77.2 | 5.8   |
| 8              | .638                                           | .789                                                         | .471    | .318    | 81.8                          | 84.5                                                                | 77.6 | 6.9   |
| 9              | .643                                           | .795                                                         | .477    | .318    | 83.7                          | 86.8                                                                | 77.2 | 9.6   |
| 10             | .643                                           | .794                                                         | .484    | .310    | 85.1                          | 89.2                                                                | 77.6 | 11.6  |
| 11             | .632                                           | .784                                                         | .450    | .334    | 86.2                          | 89.8                                                                | 77.2 | 12.6  |
|                |                                                |                                                              |         |         |                               |                                                                     |      |       |
| Noon.          | .615                                           | .777                                                         | .443    | .334    | 86.9                          | 90.2                                                                | 77.2 | 13.0  |
| 1              | .596                                           | .757                                                         | .420    | .337    | 86.7                          | 91.1                                                                | 77.6 | 13.5  |
| 2              | .573                                           | .724                                                         | .408    | .316    | 86.4                          | 91.4                                                                | 79.1 | 12.3  |
| 3              | .553                                           | .705                                                         | .371    | .334    | 85.6                          | 91.8                                                                | 79.3 | 12.5  |
| 4              | .535                                           | .704                                                         | .355    | .349    | 85.1                          | 90.8                                                                | 79.8 | 11.0  |
| 5              | .536                                           | .689                                                         | .359    | .330    | 84.5                          | 89.4                                                                | 80.0 | 9.4   |
| 6              | .545                                           | .703                                                         | .375    | .328    | 83.3                          | 87.6                                                                | 79.8 | 7.8   |
| 7              | .560                                           | .704                                                         | .377    | .327    | 82.7                          | 86.0                                                                | 79.8 | 6.2   |
| 8              | .589                                           | .740                                                         | .403    | .337    | 82.3                          | 85.0                                                                | 79.1 | 5.9   |
| 9              | .613                                           | .776                                                         | .432    | .344    | 82.0                          | 84.8                                                                | 79.2 | 5.6   |
| 10             | .622                                           | .776                                                         | .428    | .348    | 81.6                          | 83.6                                                                | 79.0 | 4.6   |
| 11             | .623                                           | .782                                                         | .420    | .362    | 81.4                          | 83.6                                                                | 77.8 | 5.8   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of Air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 79.2                            | 2.0                 | 78.2                | 3.0                          | 0.946                            | 10.19                                                 | 1.02                                                                     | 0.91                                                                 |
| 1              | 79.0                            | 2.0                 | 78.0                | 3.0                          | .940                             | .13                                                   | .01                                                                      | .91                                                                  |
| 2              | 79.0                            | 1.8                 | 78.1                | 2.7                          | .943                             | .16                                                   | 0.91                                                                     | .92                                                                  |
| 3              | 78.9                            | 1.7                 | 78.0                | 2.6                          | .940                             | .13                                                   | .88                                                                      | .92                                                                  |
| 4              | 78.7                            | 1.7                 | 77.8                | 2.6                          | .934                             | .07                                                   | .87                                                                      | .92                                                                  |
| 5              | 78.3                            | 1.7                 | 77.4                | 2.6                          | .922                             | 9.95                                                  | .86                                                                      | .92                                                                  |
| 6              | 78.3                            | 1.7                 | 77.4                | 2.6                          | .922                             | .95                                                   | .86                                                                      | .92                                                                  |
| 7              | 78.7                            | 2.0                 | 77.7                | 3.0                          | .931                             | 10.04                                                 | 1.00                                                                     | .91                                                                  |
| 8              | 79.3                            | 2.5                 | 78.0                | 3.8                          | .940                             | .11                                                   | .29                                                                      | .89                                                                  |
| 9              | 80.0                            | 3.7                 | 78.1                | 5.6                          | .943                             | .10                                                   | .97                                                                      | .84                                                                  |
| 10             | 80.5                            | 4.6                 | 78.2                | 6.9                          | .946                             | .11                                                   | 2.46                                                                     | .80                                                                  |
| 11             | 80.9                            | 5.3                 | 78.2                | 8.0                          | .946                             | .09                                                   | .90                                                                      | .78                                                                  |
| Noon.          | 81.2                            | 5.7                 | 78.3                | 8.6                          | .949                             | .09                                                   | 3.16                                                                     | .76                                                                  |
| 1              | 81.2                            | 5.5                 | 78.4                | 8.3                          | .952                             | .15                                                   | .03                                                                      | .77                                                                  |
| 2              | 81.0                            | 5.4                 | 78.3                | 8.1                          | .949                             | .12                                                   | 2.94                                                                     | .78                                                                  |
| 3              | 80.7                            | 4.9                 | 78.2                | 7.4                          | .946                             | .11                                                   | .65                                                                      | .79                                                                  |
| 4              | 80.6                            | 4.5                 | 78.3                | 6.8                          | .949                             | .14                                                   | .43                                                                      | .81                                                                  |
| 5              | 80.3                            | 4.2                 | 78.2                | 6.3                          | .946                             | .13                                                   | .22                                                                      | .82                                                                  |
| 6              | 79.9                            | 3.4                 | 78.2                | 5.1                          | .946                             | .15                                                   | 1.78                                                                     | .85                                                                  |
| 7              | 79.7                            | 3.0                 | 78.2                | 4.5                          | .946                             | .15                                                   | .57                                                                      | .87                                                                  |
| 8              | 79.4                            | 2.9                 | 77.9                | 4.4                          | .937                             | .08                                                   | .50                                                                      | .87                                                                  |
| 9              | 79.3                            | 2.7                 | 77.9                | 4.1                          | .937                             | .08                                                   | .39                                                                      | .88                                                                  |
| 10             | 79.2                            | 2.4                 | 78.0                | 3.6                          | .940                             | .11                                                   | .23                                                                      | .89                                                                  |
| 11             | 79.2                            | 2.2                 | 78.1                | 3.3                          | .943                             | .16                                                   | .11                                                                      | .90                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                   |
|-------|-----------------------|---------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                                              |
| 1     | ...                   | 2.58                            | S. & W.                           | Scatd. \i till 2 P. M. cloudy afterwards ; also raining between 3 & 9 P. M.                                  |
| 2     | ..                    | 0.40                            | E. & S.                           | Cloudy, with drizzling between 6 & 8 A. M. & also at 3 P. M.                                                 |
| 3     | ...                   | 0.14                            | S. & E.                           | Cloudless till 5 A. M. Scatd. clouds till 7 P. M. cloudless afterwards ; also drizzling at Noon & 2 P. M.    |
| 4     | <i>Sunday.</i>        | ...                             |                                   |                                                                                                              |
| 5     | 135.0                 | ...                             | S. & E.                           | Cloudless till 1 A. M. Scatd. clouds till 8 P. M. cloudless afterwards.                                      |
| 6     | 129.0                 | ...                             | S. & S. W.                        | Scatd clouds.                                                                                                |
| 7     | ...                   | 1.08                            | S. & calm.                        | Cloudy, with incessant drizzling between 2 A. M. & 1 P. M.                                                   |
| 8     | ...                   | ...                             | S. & S. W.                        | Cloudy ; also drizzling at Midnight & also between 9 A. M. & 1 P. M. & also between 10 & 11 P. M.            |
| 9     | ...                   | 1.18                            | S.                                | Cloudy ; also incessantly raining between Midnight & 4 A. M. ; also drizzling at 8 A. M. & 3 P. M. & 6 P. M. |
| 10    | 123.9                 | ...                             | S. E. & S.                        | Scatd. clouds till 7 P. M. cloudless afterwards.                                                             |
| 11    | <i>Sunday.</i>        | ...                             |                                   |                                                                                                              |
| 12    | ...                   | ...                             | S. & S. E.                        | Scatd. clouds, with slight drizzling at 8 P. M.                                                              |
| 13    | 117.4                 | 0.12                            | S. E. & S.                        | Cloudless till 6 A. M. Scatd. \i till 11 A. M. Scatd. \i afterwards ; also raining at 1 P. M.                |
| 14    | 118.4                 | ...                             | S.                                | Cloudless till 6 A. M. Scatd \i & \i till 5 P. M. cloudless afterwards ; also slightly drizzling at 2 P. M.  |
| 15    | 119.0                 | 0.10                            | S. E. & E.                        | Cloudless till 5 A. M. Scatd. \i afterwards ; also slightly raining at 3 P. M.                               |
| 16    | ...                   | 0.11                            | S. & S. E.                        | Scatd. clouds, with occasional drizzling.                                                                    |
| 17    | ...                   | 0.24                            | E. & S. E.                        | Cloudless till 6 A. M. Scatd. clouds afterwards, with occasional raining.                                    |
| 18    | <i>Sunday.</i>        | 0.12                            |                                   |                                                                                                              |
| 19    | 122.0                 | 0.15                            | E. & N. E.                        | Scatd \i & \i ; also slightly drizzling at 4 P. M.                                                           |
| 20    | ...                   | 2.12                            | N. E. & E. & S.                   | Cloudy, with incessant rain between 2 & 9 P. M.                                                              |
| 21    | ...                   | 0.39                            | S. & S. E.                        | Cloudy & constantly drizzling.                                                                               |
| 22    | ...                   | 2.16                            | S. E. & S. & E.                   | Cloudy, with constant rain.                                                                                  |
| 23    | ...                   | 1.72                            | S. W. & S. & S. E.                | Cloudy ; also raining at 6 & 7 A. M. & 11 P. M.                                                              |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1861.

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                          |
|-------|-----------------------|---------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------|
| 24    | ...                   | 0.94                            | E. & W.                           | Cloudy, with occasional rain.                                                                       |
| 25    | Sunday.               | 0.13                            |                                   |                                                                                                     |
| 26    | 118.0                 | ...                             | E.                                | Cloudy, with occasional drizzling till 8 P. M. cloudless afterwards.                                |
| 27    | 124.5                 | 1.18                            | S. E. & S.                        | Cloudy; also drizzling at 5 & 6 A. M. & raining heavily at 2 P. M.                                  |
| 28    | ...                   | 0.10                            | E. & S.                           | Scatd. $\searrow$ i till 11 A. M. cloudy till 7 P. M. cloudless afterwards; also raining at 1 P. M. |
| 29    | ...                   | ...                             | E. & S. E. & S.                   | Scatd. clouds till 7 P. M. cloudless afterwards; also slightly drizzling at 2 P. M.                 |
| 30    | ...                   | 0.60                            | N. E. & calm.                     | Cloudless till 6 A. M. Scatd. clouds afterwards; also raining at 11 A. M. & 3 & 6 P. M.             |
| 31    | ...                   | 0.56                            | N. & N. E.                        | Cloudy & drizzling at 5 A. M. & between 3 & 11 P. M.                                                |

$\searrow$ i Cirri,  $\searrow$ i Cirro strati,  $\curvearrowright$ i Cumuli,  $\curvearrowright$ i Cumulo strati,  $\searrow$ i Nimbi, —i Strati, Cirro cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of August, 1861.*

MONTHLY RESULTS.

|                                                               |    |    | Inches |
|---------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                   | .. | .. | 29.597 |
| Max. height of the Barometer occurred at 9 A. M. on the 5th,  | .. | .. | 29.795 |
| Min. height of the Barometer occurred at 4 P. M. on the 31st, | .. | .. | 29.355 |
| <i>Extreme range</i> of the Barometer during the month,       | .. | .. | 0.440  |
| Mean of the daily Max. Pressures,                             | .. | .. | 29.653 |
| Ditto ditto Min. ditto,                                       | .. | .. | 29.531 |
| <i>Mean daily range</i> of the Barometer during the month,    | .. | .. | 0.122  |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 83.0 |
| Max. Temperature occurred at 3 P. M. on the 6th,             | .. | .. | 91.8 |
| Min. Temperature occurred at 1 P. M. on the 9th,             | .. | .. | 76.0 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 15.8 |
| Mean of the daily Max. Temperature,                          | .. | .. | 88.2 |
| Ditto ditto Min. ditto,                                      | .. | .. | 79.7 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 8.5  |

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|                                                            |    |    | °      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 79.7   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 3.3    |
| Computed Mean Dew-point for the month,                     | .. | .. | 78.0   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 5.0    |
|                                                            |    |    | Inches |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.940  |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 10.09        |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 1.73         |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.85         |

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|                                                    |    |    | Inches          |
|----------------------------------------------------|----|----|-----------------|
| Rained 26 days, Max. fall of rain during 24 hours, | .. | .. | 2.58            |
| Total amount of rain during the month,             | .. | .. | 16.12           |
| Prevailing direction of the Wind,                  | .. | .. | S. & E. & S. E. |

Abstract of the Results of the Hourly Meteorological Observations  
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in the month of August, 1861.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. |              |          | 2     |          | 8  |          | 3     |          | 13 | 2        |       |          |    |          | 1     | 1        |       |          |         |
| 1         |              |          | 2     |          | 8  |          | 4     | 1        | 12 | 1        |       |          |    |          | 1     |          |       |          |         |
| 2         |              |          | 2     |          | 7  |          | 4     | 1        | 13 | 2        |       |          |    |          | 1     |          |       |          |         |
| 3         |              |          | 2     |          | 7  |          | 4     | 1        | 11 | 2        |       |          |    |          | 1     |          |       |          | 2       |
| 4         |              |          | 2     |          | 3  | 1        | 4     | 1        | 11 | 2        |       |          |    |          | 1     |          |       |          | 6       |
| 5         | 1            |          | 3     | 1        | 7  | 1        | 3     | 1        | 9  | 1        | 1     |          | 1  | 1        |       |          |       |          | 2       |
| 6         | 1            |          | 2     |          | 6  | 1        | 5     | 1        | 9  |          | 2     | 1        | 1  | 1        |       | 1        |       |          |         |
| 7         | 1            |          | 2     |          | 9  | 1        | 6     | 2        | 5  | 1        | 2     |          | 1  |          | 1     |          |       |          |         |
| 8         | 2            |          | 3     |          | 5  | 1        | 4     |          | 6  | 2        | 2     |          | 1  | 1        |       |          |       |          | 4       |
| 9         |              |          | 4     |          | 9  | 2        | 6     |          | 8  | 2        |       |          |    | 1        |       |          |       |          |         |
| 10        |              |          | 5     |          | 7  | 1        | 7     |          | 8  | 2        |       |          |    |          |       |          |       |          |         |
| 11        |              |          | 5     | 1        | 7  |          | 7     |          | 8  | 2        |       |          |    |          |       |          |       |          |         |
| Noon.     |              |          | 5     |          | 5  | 1        | 8     | 2        | 7  | 3        | 2     |          |    |          |       |          |       |          |         |
| 1         | 1            |          | 2     |          | 9  | 1        | 8     | 2        | 6  | 3        |       |          | 1  |          |       |          |       |          |         |
| 2         | 2            | 1        | 2     | 1        | 6  | 1        | 3     | 2        | 11 | 2        | 3     | 1        |    |          |       |          |       |          |         |
| 3         | 1            | 1        | 2     | 2        | 4  | 1        | 10    | 2        | 4  | 1        | 6     | 2        |    |          |       |          |       |          |         |
| 4         | 2            | 1        | 1     | 1        | 2  |          | 7     | 4        | 11 | 1        | 1     |          | 1  |          |       |          |       |          | 2       |
| 5         | 1            |          |       |          | 5  | 1        | 7     | 1        | 11 | 1        | 2     |          | 1  | 1        | 1     |          |       |          |         |
| 6         | 1            | 1        | 1     |          | 4  | 2        | 4     |          | 10 | 3        | 2     |          | 2  | 1        |       | 2        | 1     | 1        |         |
| 7         | 1            | 1        | 1     |          | 6  | 2        | 4     |          | 9  | 1        | 2     |          | 1  | 1        |       |          |       |          |         |
| 8         | 1            |          | 1     |          | 7  | 1        | 3     |          | 11 | 1        | 1     |          | 1  | 1        |       |          |       |          |         |
| 9         | 1            |          | 1     |          | 7  | 1        | 2     |          | 11 |          | 2     |          | 1  | 1        |       |          |       |          |         |
| 10        | 1            | 1        | 1     |          | 7  | 1        | 2     |          | 12 | 1        | 1     |          | 1  |          |       |          |       |          |         |
| 11        | 1            | 1        | 1     |          | 7  |          | 2     |          | 11 | 2        | 1     |          | 1  |          |       |          |       |          | 1       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 2     | 29.505                                          | 29.554                                    | 29.453  | 0.101   | 84.6                          | 90.4                                          | 79.4 | 11.0  |
| 3     | .506                                            | .565                                      | .431    | .134    | 85.9                          | 90.2                                          | 82.3 | 7.9   |
| 4     | .446                                            | .487                                      | .368    | .119    | 82.6                          | 87.0                                          | 78.6 | 8.4   |
| 5     | .484                                            | .558                                      | .435    | .123    | 80.2                          | 82.8                                          | 78.6 | 4.2   |
| 6     | .568                                            | .620                                      | .513    | .107    | 83.4                          | 89.0                                          | 79.0 | 10.0  |
| 7     | .609                                            | .652                                      | .556    | .096    | 83.5                          | 88.2                                          | 80.2 | 8.0   |
| 8     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 9     | .638                                            | .688                                      | .581    | .107    | 84.7                          | 90.0                                          | 81.2 | 8.8   |
| 10    | .659                                            | .722                                      | .606    | .116    | 84.7                          | 89.8                                          | 81.2 | 8.6   |
| 11    | .704                                            | .770                                      | .653    | .117    | 85.1                          | 89.8                                          | 81.7 | 8.1   |
| 12    | .726                                            | .790                                      | .667    | .123    | 83.7                          | 87.2                                          | 80.2 | 7.0   |
| 13    | .712                                            | .772                                      | .651    | .121    | 84.4                          | 88.8                                          | 79.6 | 9.2   |
| 14    | .708                                            | .770                                      | .636    | .134    | 84.0                          | 89.2                                          | 79.7 | 9.5   |
| 15    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 16    | .649                                            | .695                                      | .575    | .120    | 83.7                          | 89.0                                          | 81.2 | 7.8   |
| 17    | .680                                            | .730                                      | .620    | .110    | 84.5                          | 91.8                                          | 79.4 | 12.4  |
| 18    | .724                                            | .782                                      | .674    | .108    | 83.2                          | 85.4                                          | 81.6 | 3.8   |
| 19    | .702                                            | .757                                      | .637    | .120    | 82.8                          | 89.4                                          | 80.6 | 8.8   |
| 20    | .642                                            | .698                                      | .582    | .116    | 80.9                          | 83.2                                          | 79.6 | 3.6   |
| 21    | .645                                            | .715                                      | .593    | .122    | 81.9                          | 85.6                                          | 78.6 | 7.0   |
| 22    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 23    | .778                                            | .836                                      | .724    | .112    | 83.6                          | 88.4                                          | 79.2 | 9.2   |
| 24    | .757                                            | .826                                      | .679    | .147    | 85.3                          | 91.2                                          | 80.6 | 10.6  |
| 25    | .746                                            | .790                                      | .686    | .104    | 84.7                          | 90.0                                          | 81.2 | 8.8   |
| 26    | .795                                            | .854                                      | .749    | .105    | 84.3                          | 90.1                                          | 80.2 | 9.9   |
| 27    | .811                                            | .879                                      | .737    | .142    | 85.5                          | 91.6                                          | 80.6 | 11.0  |
| 28    | .753                                            | .810                                      | .702    | .108    | 82.3                          | 89.2                                          | 78.8 | 10.4  |
| 29    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 30    | .673                                            | .730                                      | .597    | .133    | 82.1                          | 86.6                                          | 79.0 | 7.6   |

The Mean height of the Barometer as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 2     | 81.0                            | 3.6                 | 79.2                | 5.4                          | 0.976                            | 10.45                                            | 1.94                                                                    | 0.84                                                                |
| 3     | 82.5                            | 3.4                 | 80.8                | 5.1                          | 1.027                            | .96                                              | .91                                                                     | .85                                                                 |
| 4     | 79.9                            | 2.7                 | 78.5                | 4.1                          | 0.955                            | .27                                              | .41                                                                     | .88                                                                 |
| 5     | 77.9                            | 2.3                 | 76.7                | 3.5                          | .902                             | 9.72                                             | .16                                                                     | .89                                                                 |
| 6     | 79.8                            | 3.6                 | 78.0                | 5.4                          | .940                             | 10.09                                            | .87                                                                     | .84                                                                 |
| 7     | 80.5                            | 3.0                 | 79.0                | 4.5                          | .970                             | .40                                              | .60                                                                     | .87                                                                 |
| 8     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 9     | 80.8                            | 3.9                 | 78.8                | 5.9                          | .964                             | .31                                              | 2.11                                                                    | .83                                                                 |
| 10    | 81.0                            | 3.7                 | 79.1                | 5.6                          | .973                             | .40                                              | .02                                                                     | .84                                                                 |
| 11    | 81.1                            | 4.0                 | 79.1                | 6.0                          | .973                             | .40                                              | .17                                                                     | .83                                                                 |
| 12    | 80.4                            | 3.3                 | 78.7                | 5.0                          | .961                             | .31                                              | 1.76                                                                    | .85                                                                 |
| 13    | 80.9                            | 3.5                 | 79.1                | 5.3                          | .973                             | .42                                              | .89                                                                     | .85                                                                 |
| 14    | 80.5                            | 3.5                 | 78.7                | 5.3                          | .961                             | .31                                              | .86                                                                     | .85                                                                 |
| 15    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 16    | 80.0                            | 3.7                 | 78.1                | 5.6                          | .943                             | .10                                              | .97                                                                     | .84                                                                 |
| 17    | 79.8                            | 4.7                 | 77.4                | 7.1                          | .922                             | 9.87                                             | 2.48                                                                    | .80                                                                 |
| 18    | 79.9                            | 3.3                 | 78.2                | 5.0                          | .946                             | 10.15                                            | 1.74                                                                    | .85                                                                 |
| 19    | 79.8                            | 3.0                 | 78.3                | 4.5                          | .949                             | .18                                              | .57                                                                     | .87                                                                 |
| 20    | 79.0                            | 1.9                 | 78.0                | 2.9                          | .940                             | .13                                              | 0.97                                                                    | .91                                                                 |
| 21    | 79.3                            | 2.6                 | 78.0                | 3.9                          | .940                             | .11                                              | 1.33                                                                    | .88                                                                 |
| 22    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 23    | 80.2                            | 3.4                 | 78.5                | 5.1                          | .955                             | .25                                              | .78                                                                     | .85                                                                 |
| 24    | 81.0                            | 4.3                 | 78.8                | 6.5                          | .964                             | .29                                              | 2.35                                                                    | .81                                                                 |
| 25    | 80.4                            | 4.3                 | 78.2                | 6.5                          | .946                             | .11                                              | .31                                                                     | .81                                                                 |
| 26    | 79.6                            | 4.7                 | 77.2                | 7.1                          | .916                             | 9.81                                             | .47                                                                     | .80                                                                 |
| 27    | 80.1                            | 5.4                 | 77.4                | 8.1                          | .922                             | .85                                              | .87                                                                     | .77                                                                 |
| 28    | 79.0                            | 3.3                 | 77.3                | 5.0                          | .919                             | .88                                              | 1.70                                                                    | .85                                                                 |
| 29    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 30    | 79.3                            | 2.8                 | 77.9                | 4.2                          | .937                             | 10.08                                            | .43                                                                     | .88                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



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in the month of September, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | °                             | °                                                              | °    | °     |
| Mid-<br>night. | 29.677                                          | 29.817                                                       | 29.460  | 0.357   | 81.7                          | 84.8                                                           | 79.0 | 5.8   |
| 1              | .665                                            | .808                                                         | .456    | .352    | 81.5                          | 84.2                                                           | 79.0 | 5.2   |
| 2              | .653                                            | .797                                                         | .447    | .350    | 81.4                          | 84.0                                                           | 79.0 | 5.0   |
| 3              | .642                                            | .788                                                         | .435    | .353    | 81.1                          | 83.8                                                           | 79.0 | 4.8   |
| 4              | .656                                            | .783                                                         | .434    | .349    | 81.1                          | 83.8                                                           | 79.2 | 4.6   |
| 5              | .633                                            | .799                                                         | .436    | .363    | 80.8                          | 83.8                                                           | 78.6 | 5.2   |
| 6              | .669                                            | .824                                                         | .443    | .381    | 80.7                          | 83.6                                                           | 78.8 | 4.8   |
| 7              | .685                                            | .854                                                         | .452    | .402    | 81.1                          | 83.8                                                           | 78.6 | 5.2   |
| 8              | .704                                            | .879                                                         | .460    | .419    | 83.0                          | 85.6                                                           | 80.3 | 5.3   |
| 9              | .717                                            | .872                                                         | .473    | .399    | 84.5                          | 87.6                                                           | 80.6 | 7.0   |
| 10             | .715                                            | .867                                                         | .479    | .388    | 85.4                          | 88.5                                                           | 80.0 | 8.5   |
| 11             | .706                                            | .859                                                         | .469    | .390    | 86.2                          | 89.2                                                           | 79.3 | 9.9   |
|                |                                                 |                                                              |         |         |                               |                                                                |      |       |
| Noon.          | .686                                            | .842                                                         | .427    | .415    | 87.0                          | 90.0                                                           | 80.6 | 9.4   |
| 1              | .661                                            | .817                                                         | .379    | .438    | 87.1                          | 90.0                                                           | 78.8 | 11.2  |
| 2              | .633                                            | .780                                                         | .368    | .412    | 86.9                          | 91.2                                                           | 79.8 | 11.4  |
| 3              | .617                                            | .760                                                         | .405    | .355    | 86.9                          | 91.8                                                           | 80.4 | 11.4  |
| 4              | .610                                            | .749                                                         | .426    | .323    | 86.3                          | 91.6                                                           | 79.2 | 12.4  |
| 5              | .610                                            | .758                                                         | .416    | .342    | 85.2                          | 89.8                                                           | 79.2 | 10.6  |
| 6              | .623                                            | .765                                                         | .419    | .346    | 84.3                          | 88.0                                                           | 78.6 | 9.4   |
| 7              | .643                                            | .791                                                         | .453    | .338    | 83.6                          | 86.2                                                           | 79.2 | 7.0   |
| 8              | .668                                            | .822                                                         | .465    | .357    | 83.1                          | 86.4                                                           | 79.5 | 6.9   |
| 9              | .685                                            | .838                                                         | .487    | .351    | 82.7                          | 86.2                                                           | 79.3 | 6.9   |
| 10             | .691                                            | .834                                                         | .487    | .347    | 82.4                          | 85.8                                                           | 79.3 | 6.5   |
| 11             | .696                                            | .820                                                         | .482    | .338    | 81.8                          | 84.8                                                           | 79.2 | 5.6   |

The Mean Height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew point. | Dry Bulb above Dew<br>point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of Air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 79.4                          | 2.3                 | 78.2                | 3.5                          | 0.946                            | 10.17                                                 | 1.20                                                                | 0.89                                                                |
| 1              | 79.4                          | 2.1                 | 78.3                | 3.2                          | .949                             | .22                                                   | .09                                                                 | .90                                                                 |
| 2              | 79.4                          | 2.0                 | 78.4                | 3.0                          | .952                             | .25                                                   | .02                                                                 | .91                                                                 |
| 3              | 79.2                          | 1.9                 | 78.2                | 2.9                          | .946                             | .19                                                   | 0.98                                                                | .91                                                                 |
| 4              | 79.3                          | 1.8                 | 78.4                | 2.7                          | .952                             | .25                                                   | .92                                                                 | .92                                                                 |
| 5              | 78.9                          | 1.9                 | 77.9                | 2.9                          | .937                             | .10                                                   | .97                                                                 | .91                                                                 |
| 6              | 78.8                          | 1.9                 | 77.8                | 2.9                          | .934                             | .07                                                   | .97                                                                 | .91                                                                 |
| 7              | 79.3                          | 1.8                 | 78.4                | 2.7                          | .952                             | .25                                                   | .92                                                                 | .92                                                                 |
| 8              | 80.1                          | 2.9                 | 78.6                | 4.4                          | .958                             | .30                                                   | 1.52                                                                | .87                                                                 |
| 9              | 80.6                          | 3.9                 | 78.6                | 5.9                          | .958                             | .26                                                   | 2.09                                                                | .83                                                                 |
| 10             | 80.8                          | 4.6                 | 78.5                | 6.9                          | .955                             | .21                                                   | .47                                                                 | .81                                                                 |
| 11             | 81.1                          | 5.1                 | 78.5                | 7.7                          | .955                             | .18                                                   | .81                                                                 | .78                                                                 |
| Noon.          | 81.4                          | 5.6                 | 78.6                | 8.4                          | .958                             | .21                                                   | 3.08                                                                | .77                                                                 |
| 1              | 81.2                          | 5.9                 | 78.2                | 8.9                          | .946                             | .07                                                   | .26                                                                 | .76                                                                 |
| 2              | 81.1                          | 5.8                 | 78.2                | 8.7                          | .946                             | .07                                                   | .18                                                                 | .76                                                                 |
| 3              | 81.2                          | 5.7                 | 78.3                | 8.6                          | .949                             | .09                                                   | .16                                                                 | .76                                                                 |
| 4              | 80.9                          | 5.4                 | 78.2                | 8.1                          | .946                             | .09                                                   | 2.93                                                                | .78                                                                 |
| 5              | 80.5                          | 4.7                 | 78.1                | 7.1                          | .943                             | .08                                                   | .53                                                                 | .80                                                                 |
| 6              | 80.5                          | 3.8                 | 78.6                | 5.7                          | .958                             | .26                                                   | .02                                                                 | .84                                                                 |
| 7              | 80.5                          | 3.1                 | 78.9                | 4.7                          | .967                             | .37                                                   | 1.66                                                                | .86                                                                 |
| 8              | 80.1                          | 3.0                 | 78.6                | 4.5                          | .958                             | .28                                                   | .58                                                                 | .87                                                                 |
| 9              | 79.9                          | 2.8                 | 78.5                | 4.2                          | .955                             | .27                                                   | .45                                                                 | .88                                                                 |
| 10             | 79.8                          | 2.6                 | 78.5                | 3.9                          | .955                             | .27                                                   | .34                                                                 | .89                                                                 |
| 11             | 79.4                          | 2.4                 | 78.2                | 3.6                          | .946                             | .17                                                   | .23                                                                 | .89                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                       |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                                                                  |
| 1     | <i>Sunday.</i>        | 2.15                            |                                   |                                                                                                                                  |
| 2     | 130.0                 | 0.50                            | S. & E.                           | Cloudy till 7 A. M. Scatd. ∩i & ∪i till 7 P. M. cloudless afterwards; also raining at 3 & 4 A. M.                                |
| 3     | ...                   | 0.26                            | S. & calm.                        | Cloudless till 4 A. M. cloudy afterwards; also raining at Noon.                                                                  |
| 4     | ...                   | 3.01                            | W.                                | Cloudy; also incessant rain between 2 & 8 P. M.                                                                                  |
| 5     | ...                   | 0.56                            | W.                                | Cloudy; also drizzling at 10 & 11 A. M. & 8 & 9 P. M.                                                                            |
| 6     | ...                   | 0.08                            | S. & S. W.                        | Cloudy till 6 A. M. Scatd. ∪i & ∩i till 5 P. M. cloudless afterwards; also raining between 1 & 2 A. M.                           |
| 7     | ...                   | 0.11                            | S.                                | Cloudy till 5 P. M. cloudless afterwards; also drizzling at 7 & 10 A. M.                                                         |
| 8     | <i>Sunday.</i>        | 0.34                            |                                   |                                                                                                                                  |
| 9     | 132.8                 | ...                             | S.                                | Cloudless till 5 A. M. Scatd ∪i & ∩i afterwards.                                                                                 |
| 10    | ...                   | 0.40                            | S. & S. E.                        | Cloudless till 2 A. M. Scatd. ∪i & ∩i till 5 P. M. cloudless afterwards; also raining at 3 A. M. & drizzling between 3 & 4 P. M. |
| 11    | 127.0                 | ...                             | S.                                | Cloudless till 4 A. M. Scatd. ∪i & ∩i till 6 P. M. cloudless afterwards.                                                         |
| 12    | ...                   | 0.72                            | S.                                | Cloudy; also occasionally drizzling between Midnight & Noon.                                                                     |
| 13    | ...                   | 1.09                            | S. & S. W.                        | Cloudy; also raining at 8 & 11 P. M.                                                                                             |
| 14    | ...                   | ...                             | S. & S. W.                        | Cloudy; also drizzling at Midnight & 11 A. M.                                                                                    |
| 15    | <i>Sunday.</i>        | 0.16                            |                                   |                                                                                                                                  |
| 16    | 125.0                 | ...                             | W. & S.                           | Cloudy till 5 P. M. cloudless afterwards.                                                                                        |
| 17    | 135.4                 | ...                             | N. & W.                           | Cloudy.                                                                                                                          |
| 18    | ...                   | ...                             | E. & S. W. & S.                   | Scatd. ∪i & ∩i till 5 A. M. cloudy afterwards; also drizzling at 9 A. M.                                                         |
| 19    | 135.0                 | 0.26                            | S. & N. E.                        | Cloudy; also drizzling at 2 & 3 P. M.                                                                                            |
| 20    | ...                   | 0.41                            | N. E.                             | Cloudy; also drizzling at 7 A. M. & between 2 & 6 P. M.                                                                          |
| 21    | 121.4                 | 0.30                            | S. E. & E.                        | Cloudy; also drizzling between 1 & 4 A. M. & at 5 P. M.                                                                          |
| 22    | <i>Sunday.</i>        | 0.38                            |                                   |                                                                                                                                  |
| 23    | 137.0                 | ...                             | S. & S. E.                        | Scatd. clouds of various kinds till 9 A. M. cloudless afterwards; also drizzling at 7 A. M.                                      |

∩i Cirri, ∪i Cirro strati, ∩i Cumuli, ∩i Cumulo strati, ∪i Nimbi, —i Strati, ∪i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge<br>5 feet above<br>Ground. | Prevailing direction<br>of the Wind. | General Aspect of the Sky.                                                                                                    |
|-------|-----------------------|---------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|       |                       | Inches.                               |                                      |                                                                                                                               |
| 24    | 140.0                 | ...                                   | S. & S. W.                           | Cloudless till 6 A. M. Scatd. $\searrow$ i & $\nearrow$ i<br>till 7 P. M. cloudless afterwards.                               |
| 25    | 136.0                 | ...                                   | S. & calm.                           | Cloudless till 7 A. M. Scatd. $\searrow$ i & $\nearrow$ i<br>till 8 P. M. cloudless afterwards.                               |
| 26    | 138.5                 | ...                                   | S.                                   | Scatd. clouds till 8 P. M. cloudless af-<br>terwards.                                                                         |
| 27    | 142.0                 | ...                                   | E. & S. E.                           | Cloudless till 6 A. M. Scatd. $\searrow$ i & $\nearrow$ i<br>till 9 P. M. cloudless afterwards ; also<br>drizzling at 7 P. M. |
| 28    | 127.0                 | 0.70                                  | E. & N.                              | Cloudless till 5 A. M. cloudy afterwards ;<br>also drizzling between 1 & 7 P. M.                                              |
| 29    | <i>Sunday.</i>        | 0.79                                  |                                      |                                                                                                                               |
| 30    | ...                   | 0.26                                  | E. & S. E.                           | Cloudless till 4 A. M. cloudy till 6<br>P. M. cloudless afterwards ; also rain-<br>ing between Noon & 1 P. M.                 |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1861.*

MONTHLY RESULTS.

|                                                               | Inches |
|---------------------------------------------------------------|--------|
| Mean height of the Barometer for the month, ..                | 29.665 |
| Max. height of the Barometer occurred at 8 A. M. on the 27th, | 29.879 |
| Min. height of the Barometer occurred at 2 P. M. on the 4th,  | 29.368 |
| <i>Extreme range</i> of the Barometer during the month, ..    | 0.511  |
| Mean of the Daily Max. Pressures,                             | 29.722 |
| Ditto ditto Min. ditto, ..                                    | 29.604 |
| <i>Mean daily range</i> of the Barometer during the month,    | 0.118  |

|                                                              | o    |
|--------------------------------------------------------------|------|
| Mean Dry Bulb Thermometer for the month,                     | 83.7 |
| Max. Temperature occurred at 3 P. M. on the 17th,            | 91.8 |
| Min. Temperature occurred at 5 A. M. on the 5th,             | 78.6 |
| <i>Extreme range</i> of the Temperature during the month,    | 13.2 |
| Mean of the daily Max. Temperature, ..                       | 88.6 |
| Ditto ditto Min. ditto, ..                                   | 80.1 |
| <i>Mean daily range</i> of the Temperature during the month, | 8.5  |
| Mean Wet Bulb Thermometer for the month, ..                  | 80.1 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,   | 3.6  |
| Computed Mean Dew-point for the month, ..                    | 78.3 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,     | 5.4  |

|                                             | Inches |
|---------------------------------------------|--------|
| Mean Elastic force of Vapour for the month, | 0.949  |

|                                                                         | Troy grains |
|-------------------------------------------------------------------------|-------------|
| Mean Weight of Vapour for the month,                                    | 10.18       |
| Additional Weight of Vapour required for complete saturation,           | 1.89        |
| Mean degree of humidity for the month, complete saturation being unity, | 0.84        |

|                                                    | Inches |
|----------------------------------------------------|--------|
| Rained 22 days, Max. fall of rain during 24 hours, | 3.01   |
| Total amount of rain during the month,             | 12.48  |
| Prevailing direction of the Wind, ..               | S.     |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of September, 1861.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 1            |          | 1     |          | 2  |          | 1     |          | 11 | 1        | 2     |          | 1  |          |       |          | 5     |          | 1       |
| 1         | 1            |          | 1     |          | 2  |          | 1     |          | 13 | 1        | 2     |          | 1  |          |       |          | 4     |          |         |
| 2         | 1            | 1        | 1     |          | 2  |          | 1     |          | 13 | 1        | 2     | 1        | 2  |          |       |          | 3     |          |         |
| 3         | 1            | 1        | 1     |          | 2  |          | 2     | 1        | 11 | 1        | 2     |          | 2  |          |       |          | 3     |          | 1       |
| 4         |              |          | 1     |          | 3  | 1        | 1     |          | 10 | 1        | 1     |          | 1  |          |       |          | 3     |          | 5       |
| 5         | 1            |          | 1     |          | 2  |          | 1     |          | 7  |          | 3     |          | 2  |          |       |          | 2     |          | 6       |
| 6         | 2            |          | 1     |          | 5  |          | 1     |          | 10 | 1        | 2     |          | 2  |          |       |          | 2     |          |         |
| 7         | 2            |          | 1     | 1        | 5  | 1        | 1     |          | 11 | 2        | 1     |          | 2  |          |       |          | 2     |          |         |
| 8         | 1            |          | 2     |          | 4  |          |       |          | 13 |          | 1     |          | 4  |          |       |          |       |          |         |
| 9         | 2            |          | 1     |          | 1  |          | 2     |          | 13 |          | 1     | 1        | 3  |          | 1     |          |       |          | 1       |
| 10        | 2            |          | 2     |          | 3  |          | 1     |          | 11 | 1        | 2     |          | 4  | 1        |       |          |       |          |         |
| 11        | 1            |          | 2     |          | 2  |          | 4     |          | 12 |          | 1     |          | 3  | 1        |       |          |       |          |         |
| Noon.     | 1            |          | 4     |          | 1  |          | 3     |          | 9  | 2        | 5     |          | 1  |          | 1     |          |       |          |         |
| 1         | 2            |          | 4     | 1        |    |          | 5     | 1        | 7  |          | 5     |          | 2  |          |       |          |       |          |         |
| 2         |              |          | 3     | 2        | 4  | 2        | 2     |          | 10 |          | 3     |          | 2  |          | 1     |          |       |          |         |
| 3         |              |          | 4     | 2        | 3  | 1        | 3     |          | 9  |          | 4     |          | 1  |          | 1     |          |       |          |         |
| 4         | 2            | 1        | 4     | 2        | 4  |          | 4     |          | 6  | 1        | 4     |          | 1  |          |       |          |       |          |         |
| 5         | 1            | 1        | 2     | 1        | 5  | 2        | 2     |          | 12 |          |       |          | 1  |          | 2     |          |       |          |         |
| 6         | 1            | 1        | 2     | 1        | 3  |          | 2     |          | 13 |          | 1     |          | 2  |          | 1     |          |       |          |         |
| 7         |              |          | 2     |          | 3  | 2        | 2     |          | 12 |          | 2     |          | 4  |          |       |          |       |          |         |
| 8         |              |          | 1     |          | 3  |          | 2     |          | 12 | 1        | 4     | 1        | 3  | 1        |       |          |       |          |         |
| 9         |              |          | 1     |          | 3  |          | 2     |          | 11 |          | 4     | 1        | 3  |          |       |          | 1     |          |         |
| 10        |              |          | 1     |          | 3  |          | 2     |          | 10 |          | 4     |          | 2  |          |       |          | 2     |          | 1       |
| 11        |              |          | 1     |          | 2  |          | 2     |          | 9  | 1        | 4     | 1        | 3  |          |       |          | 2     |          | 2       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahrt. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|--------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                  | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                          | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.661                                           | 29.729                                    | 29.613  | 0.116   | 82.0                          | 87.4                                          | 79.6 | 7.8   |
| 2     | .649                                             | .704                                      | .586    | .118    | 81.5                          | 85.0                                          | 79.2 | 5.8   |
| 3     | .674                                             | .723                                      | .618    | .105    | 83.0                          | 88.8                                          | 78.3 | 10.5  |
| 4     | .654                                             | .728                                      | .585    | .143    | 84.5                          | 90.0                                          | 80.4 | 9.6   |
| 5     | .593                                             | .676                                      | .523    | .153    | 79.6                          | 83.2                                          | 74.0 | 9.2   |
| 6     | <i>Sunday.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 7     | .728                                             | .778                                      | .691    | .087    | 82.5                          | 87.6                                          | 78.8 | 8.8   |
| 8     | .719                                             | .785                                      | .615    | .170    | 81.9                          | 86.6                                          | 77.0 | 9.6   |
| 9     | .708                                             | .764                                      | .655    | .109    | 78.8                          | 81.8                                          | 76.0 | 5.8   |
| 10    | .729                                             | .783                                      | .686    | .097    | 79.9                          | 84.4                                          | 76.0 | 8.4   |
| 11    | .774                                             | .819                                      | .730    | .089    | 82.2                          | 86.3                                          | 78.6 | 7.7   |
| 12    | .803                                             | .861                                      | .754    | .107    | 82.8                          | 88.0                                          | 79.0 | 9.0   |
| 13    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 14    | .796                                             | .859                                      | .732    | .127    | 82.6                          | 85.6                                          | 79.8 | 5.8   |
| 15    | .747                                             | .811                                      | .675    | .136    | 81.4                          | 86.0                                          | 78.8 | 7.2   |
| 16    | .749                                             | .798                                      | .688    | .110    | 82.5                          | 87.4                                          | 79.4 | 8.0   |
| 17    | .816                                             | .901                                      | .752    | .149    | 81.1                          | 87.0                                          | 78.2 | 8.8   |
| 18    | .916                                             | .979                                      | .847    | .132    | 79.2                          | 82.9                                          | 76.0 | 6.9   |
| 19    | .939                                             | 30.007                                    | .892    | .115    | 81.3                          | 87.0                                          | 76.0 | 11.0  |
| 20    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 21    | .946                                             | .018                                      | .902    | .116    | 82.7                          | 89.0                                          | 78.2 | 10.8  |
| 22    | .965                                             | .049                                      | .923    | .126    | 82.4                          | 87.7                                          | 76.8 | 10.9  |
| 23    | .941                                             | .009                                      | .900    | .109    | 81.4                          | 85.9                                          | 78.2 | 7.7   |
| 24    | .713                                             | 29.985                                    | .841    | .144    | 81.0                          | 87.0                                          | 77.2 | 9.8   |
| 25    | .901                                             | .985                                      | .851    | .134    | 80.6                          | 85.5                                          | 76.6 | 8.9   |
| 26    | .905                                             | .977                                      | .863    | .114    | 79.2                          | 85.4                                          | 73.0 | 12.4  |
| 27    | <i>Sunday.</i>                                   |                                           |         |         |                               |                                               |      |       |
| 28    | .869                                             | .944                                      | .808    | .136    | 79.3                          | 85.2                                          | 74.4 | 10.8  |
| 29    | .846                                             | .901                                      | .796    | .105    | 78.6                          | 85.0                                          | 73.8 | 11.2  |
| 30    | .855                                             | .928                                      | .814    | .114    | 78.8                          | 86.0                                          | 73.8 | 12.2  |
| 31    | .856                                             | .921                                      | .807    | .114    | 80.6                          | 86.6                                          | 75.8 | 10.8  |

The Mean height of the Barometer as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Meteorological Observations.*

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 79.3                            | 2.7                 | 77.9                | 4.1                          | 0.937                            | 10.08                                            | 1.39                                                                    | 0.88                                                                |
| 2     | 79.0                            | 2.5                 | 77.7                | 3.8                          | .931                             | .02                                              | .29                                                                     | .89                                                                 |
| 3     | 79.6                            | 3.4                 | 77.9                | 5.1                          | .937                             | .06                                              | .76                                                                     | .85                                                                 |
| 4     | 80.3                            | 4.2                 | 78.2                | 6.3                          | .946                             | .13                                              | 2.22                                                                    | .82                                                                 |
| 5     | 77.8                            | 1.8                 | 76.9                | 2.7                          | .908                             | 9.80                                             | 0.89                                                                    | .92                                                                 |
| 6     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 7     | 79.8                            | 2.7                 | 78.4                | 4.1                          | .952                             | 10.23                                            | 1.41                                                                    | .88                                                                 |
| 8     | 79.4                            | 2.5                 | 78.1                | 3.8                          | .943                             | .14                                              | .30                                                                     | .89                                                                 |
| 9     | 76.8                            | 2.0                 | 75.8                | 3.0                          | .876                             | 9.48                                             | 0.96                                                                    | .91                                                                 |
| 10    | 78.1                            | 1.8                 | 77.2                | 2.7                          | .916                             | .89                                              | .89                                                                     | .92                                                                 |
| 11    | 79.1                            | 3.1                 | 77.5                | 4.7                          | .925                             | .94                                              | 1.60                                                                    | .86                                                                 |
| 12    | 79.4                            | 3.4                 | 77.7                | 5.1                          | .931                             | 10.00                                            | .75                                                                     | .85                                                                 |
| 13    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 14    | 78.4                            | 4.2                 | 76.3                | 6.3                          | .890                             | 9.57                                             | 2.11                                                                    | .82                                                                 |
| 15    | 78.1                            | 3.3                 | 76.4                | 5.0                          | .893                             | .62                                              | 1.65                                                                    | .85                                                                 |
| 16    | 77.9                            | 4.6                 | 75.6                | 6.9                          | .871                             | .35                                              | 2.29                                                                    | .80                                                                 |
| 17    | 77.4                            | 3.7                 | 75.5                | 5.6                          | .868                             | .35                                              | 1.82                                                                    | .84                                                                 |
| 18    | 76.1                            | 3.1                 | 74.5                | 4.7                          | .840                             | .09                                              | .47                                                                     | .86                                                                 |
| 19    | 76.9                            | 4.4                 | 74.7                | 6.6                          | .846                             | .10                                              | 2.14                                                                    | .81                                                                 |
| 20    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 21    | 77.7                            | 5.0                 | 75.2                | 7.5                          | .860                             | .22                                              | .50                                                                     | .79                                                                 |
| 22    | 77.3                            | 5.1                 | 74.7                | 7.7                          | .846                             | .08                                              | .53                                                                     | .78                                                                 |
| 23    | 77.6                            | 3.8                 | 75.7                | 5.7                          | .873                             | .40                                              | 1.87                                                                    | .83                                                                 |
| 24    | 76.5                            | 4.5                 | 74.2                | 6.8                          | .832                             | 8.96                                             | 2.18                                                                    | .80                                                                 |
| 25    | 75.7                            | 4.9                 | 73.2                | 7.4                          | .806                             | .70                                              | .31                                                                     | .79                                                                 |
| 26    | 72.3                            | 6.9                 | 68.8                | 10.4                         | .699                             | 7.56                                             | 3.00                                                                    | .72                                                                 |
| 27    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 28    | 74.0                            | 5.3                 | 71.3                | 8.0                          | .758                             | 8.20                                             | 2.39                                                                    | .77                                                                 |
| 29    | 73.5                            | 5.1                 | 70.9                | 7.7                          | .748                             | .10                                              | .28                                                                     | .78                                                                 |
| 30    | 74.0                            | 4.8                 | 71.6                | 7.2                          | .766                             | .28                                              | .16                                                                     | .79                                                                 |
| 31    | 75.5                            | 5.1                 | 72.9                | 7.7                          | .797                             | .59                                              | .42                                                                     | .78                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                        | Inches.                                                      | Inches. | Inches. | °                             | °                                                              | °    | °     |
| Mid-<br>night. | 29.796                                         | 29.951                                                       | 29.618  | 0.333   | 79.3                          | 83.0                                                           | 75.8 | 7.2   |
| 1              | .791                                           | .943                                                         | .604    | .339    | 79.0                          | 82.6                                                           | 75.6 | 7.0   |
| 2              | .783                                           | .935                                                         | .585    | .350    | 78.5                          | 82.8                                                           | 75.2 | 7.6   |
| 3              | .770                                           | .927                                                         | .573    | .354    | 78.5                          | 82.4                                                           | 74.7 | 7.7   |
| 4              | .777                                           | .935                                                         | .559    | .376    | 78.0                          | 82.2                                                           | 74.2 | 8.0   |
| 5              | .799                                           | .949                                                         | .628    | .321    | 77.9                          | 81.0                                                           | 73.8 | 7.2   |
| 6              | .805                                           | .979                                                         | .581    | .398    | 77.8                          | 81.8                                                           | 73.0 | 8.8   |
| 7              | .824                                           | 30.001                                                       | .597    | .404    | 78.5                          | 82.4                                                           | 73.8 | 8.6   |
| 8              | .836                                           | .007                                                         | .653    | .354    | 80.0                          | 83.2                                                           | 76.0 | 7.2   |
| 9              | .863                                           | .049                                                         | .653    | .396    | 81.5                          | 84.6                                                           | 77.2 | 7.4   |
| 10             | .862                                           | .041                                                         | .676    | .365    | 82.9                          | 86.3                                                           | 77.6 | 8.7   |
| 11             | .844                                           | .023                                                         | .648    | .375    | 83.6                          | 87.8                                                           | 77.2 | 10.6  |
| Noon.          | .823                                           | 29.998                                                       | .621    | .377    | 84.3                          | 88.7                                                           | 77.7 | 11.0  |
| 1              | .794                                           | .978                                                         | .589    | .389    | 84.9                          | 89.6                                                           | 78.8 | 10.8  |
| 2              | .771                                           | .945                                                         | .566    | .379    | 85.5                          | 90.0                                                           | 79.6 | 10.4  |
| 3              | .757                                           | .934                                                         | .551    | .383    | 85.4                          | 89.6                                                           | 80.0 | 9.6   |
| 4              | .765                                           | .931                                                         | .535    | .396    | 85.3                          | 89.0                                                           | 80.0 | 9.0   |
| 5              | .761                                           | .936                                                         | .523    | .413    | 83.7                          | 87.4                                                           | 78.4 | 9.0   |
| 6              | .769                                           | .947                                                         | .513    | .404    | 82.2                          | 86.0                                                           | 77.3 | 8.7   |
| 7              | .790                                           | .964                                                         | .567    | .397    | 81.2                          | 85.0                                                           | 76.4 | 8.6   |
| 8              | .808                                           | .977                                                         | .577    | .400    | 80.5                          | 84.2                                                           | 74.8 | 9.4   |
| 9              | .819                                           | .978                                                         | .600    | .378    | 80.0                          | 84.0                                                           | 74.6 | 9.4   |
| 10             | .815                                           | .972                                                         | .604    | .368    | 79.7                          | 83.6                                                           | 74.0 | 9.6   |
| 11             | .824                                           | .963                                                         | .624    | .339    | 79.2                          | 83.0                                                           | 74.0 | 9.0   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

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in the month of October, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 77.1                          | 2.2                 | 76.0                | 3.3                          | 0.882                            | 9.54                                                  | 1.05                                                                | 0.90                                                                |
| 1              | 77.0                          | 2.0                 | 76.0                | 3.0                          | .882                             | .54                                                   | 0.96                                                                | .91                                                                 |
| 2              | 76.6                          | 1.9                 | 75.6                | 2.9                          | .871                             | .42                                                   | .93                                                                 | .91                                                                 |
| 3              | 76.5                          | 2.0                 | 75.5                | 3.0                          | .868                             | .40                                                   | .95                                                                 | .91                                                                 |
| 4              | 76.0                          | 2.0                 | 75.0                | 3.0                          | .854                             | .25                                                   | .94                                                                 | .91                                                                 |
| 5              | 75.9                          | 2.0                 | 74.9                | 3.0                          | .851                             | .22                                                   | .94                                                                 | .91                                                                 |
| 6              | 75.9                          | 1.9                 | 74.9                | 2.9                          | .851                             | .22                                                   | .91                                                                 | .91                                                                 |
| 7              | 76.4                          | 2.1                 | 75.3                | 3.2                          | .862                             | .34                                                   | 1.01                                                                | .90                                                                 |
| 8              | 76.6                          | 3.4                 | 74.9                | 5.1                          | .851                             | .19                                                   | .62                                                                 | .85                                                                 |
| 9              | 77.3                          | 4.2                 | 75.2                | 6.3                          | .860                             | .26                                                   | 2.05                                                                | .82                                                                 |
| 10             | 77.9                          | 5.0                 | 75.4                | 7.5                          | .865                             | .28                                                   | .51                                                                 | .79                                                                 |
| 11             | 77.9                          | 5.7                 | 75.0                | 8.6                          | .854                             | .14                                                   | .89                                                                 | .76                                                                 |
| Noon.          | 78.0                          | 6.3                 | 74.8                | 9.5                          | .849                             | .07                                                   | 3.21                                                                | .74                                                                 |
| 1              | 78.2                          | 6.7                 | 74.8                | 10.1                         | .849                             | .07                                                   | .42                                                                 | .73                                                                 |
| 2              | 78.5                          | 7.0                 | 75.0                | 10.5                         | .854                             | .11                                                   | .61                                                                 | .72                                                                 |
| 3              | 78.1                          | 7.3                 | 74.4                | 11.0                         | .838                             | 8.95                                                  | .73                                                                 | .71                                                                 |
| 4              | 78.2                          | 7.1                 | 74.6                | 10.7                         | .843                             | 9.00                                                  | .64                                                                 | .71                                                                 |
| 5              | 78.0                          | 5.7                 | 75.1                | 8.6                          | .857                             | .17                                                   | 2.90                                                                | .76                                                                 |
| 6              | 78.0                          | 4.2                 | 75.9                | 6.3                          | .879                             | .46                                                   | .08                                                                 | .82                                                                 |
| 7              | 77.8                          | 3.4                 | 76.1                | 5.1                          | .885                             | .53                                                   | 1.68                                                                | .85                                                                 |
| 8              | 77.5                          | 3.0                 | 76.0                | 4.5                          | .882                             | .50                                                   | .48                                                                 | .87                                                                 |
| 9              | 77.3                          | 2.7                 | 75.9                | 4.1                          | .879                             | .49                                                   | .32                                                                 | .88                                                                 |
| 10             | 77.3                          | 2.4                 | 76.1                | 3.6                          | .885                             | .55                                                   | .17                                                                 | .89                                                                 |
| 11             | 76.8                          | 2.4                 | 75.6                | 3.6                          | .871                             | .40                                                   | .16                                                                 | .89                                                                 |

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*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                     |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                                                |
| 1     | ...                   | 0.28                            | S. E.                             | Cloudless till 4 A. M. cloudy afterwards ; also drizzling between 2 & 3 P. M.                                  |
| 2     | ...                   | 0.23                            | E. & N. E.                        | Cloudless till 6 A. M. cloudy till 7 P. M. cloudless afterwards ; also raining between 10 A. M. & Noon.        |
| 3     | ...                   | 0.08                            | E. & S. E.                        | Cloudy till 7 P. M. cloudless afterwards ; also incessantly drizzling between Midnight & 5 A. M.               |
| 4     | 130.0                 | ...                             | E. & N. E.                        | Cloudless till 3 A. M. Scatd. clouds till 6 P. M. cloudless afterwards.                                        |
| 5     | ...                   | 3.64                            | E. & W.                           | Cloudy ; also constantly raining between 11 A. M. & 11 P. M.                                                   |
| 6     | <i>Sunday.</i>        |                                 |                                   |                                                                                                                |
| 7     | ...                   | 0.18                            | E. & W.                           | Cloudless till 6 A. M. Scatd. clouds till 6 P. M. cloudless afterwards ; also drizzling between Noon & 1 P. M. |
| 8     | ...                   | ...                             | S. & W. & calm.                   | Cloudless till 4 A. M. cloudy afterwards ; also raining at 1 P. M. & between 7 & 11 P. M.                      |
| 9     | ...                   | 1.68                            | S.                                | Cloudy ; also incessantly raining between Midnight & 9 A. M. ; also slightly drizzling at 2 P. M.              |
| 10    | ...                   | 0.59                            | S. & S. E.                        | Cloudy ; also incessantly drizzling between 7 & 11 A. M.                                                       |
| 11    | ...                   | ...                             | S.                                | Scatd. clouds till 6 P. M. cloudless afterwards ; also drizzling at 6 A. M.                                    |
| 12    | ...                   | 0.12                            | S.                                | Cloudless till 6 A. M. Scatd. ∩i & ∩i afterwards ; also drizzling at 8 A. M.                                   |
| 13    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                |
| 14    | ...                   | ...                             | S. W.                             | Cloudless till 4 A. M. Scatd. clouds afterwards.                                                               |
| 15    | ...                   | ...                             | S. W. & N. W. & W.                | Cloudy till 3 P. M. cloudless afterwards ; also drizzling at 8 & 9 A. M. & at 2 & 3 P. M.                      |
| 16    | 135.0                 | ...                             | W.                                | Scatd. ∩i & ∩i.                                                                                                |
| 17    | 124.0                 | 0.30                            | S.                                | Cloudless till 7 A. M. Scatd. ∩i & ∩i afterwards ; also raining at 4 P. M.                                     |
| 18    | ...                   | 0.49                            | S. & W.                           | Cloudy ; also raining at 6 A. M. and between Noon & 1 P. M. and also between 7 & 9 P. M.                       |
| 19    | 140.0                 | ...                             | N. & S. E.                        | Scatd. ∩i & ∩i till 4 P. M. cloudless afterwards.                                                              |

∩i Cirri, ∩i Cirro strati, ∩i Cumuli, ∩i Cumulo strati, ∩i Nimbi, —i Strati, ∩i Cirro cumuli.

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taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                            |
|-------|-----------------------|---------------------------------|-----------------------------------|---------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                       |
| 20    | <i>Sunday.</i>        |                                 |                                   |                                                                                       |
| 21    | 128.4                 | ...                             | N. W. & N.                        | Cloudless till 7 A. M. Scatd. clouds till 4 P. M. cloudless afterwards.               |
| 22    | 130.0                 | ...                             | N. & N. E.                        | Cloudless till 10 A. M. Scatd. ci till 3 P. M. cloudless afterwards.                  |
| 23    | 142.0                 | 0.16                            | N.                                | Cloudless till 3 A. M. Scatd. clouds afterwards; also drizzling at 11 A. M. & 5 P. M. |
| 24    | 138.0                 | ...                             | N. & E.                           | Scatd. i till 3 P. M. cloudless afterwards.                                           |
| 25    | ...                   | ...                             | N. & W.                           | Cloudless till 8 A. M. Scatd. clouds till 3 P. M. cloudless afterwards.               |
| 26    | 139.0                 | ...                             | N. & N. E.                        | Cloudless.                                                                            |
| 27    | <i>Sunday.</i>        |                                 |                                   |                                                                                       |
| 28    | 138.0                 | ...                             | N.                                | Scatd. i till 4 A. M. cloudless afterwards.                                           |
| 29    | 138.4                 | ...                             | N. & W.                           | Cloudless till 6 A. M. Scatd. ci till 4 P. M. cloudless afterwards.                   |
| 30    | 139.0                 | ...                             | N. & W.                           | Cloudless till 10 A. M. Scatd. i till 4 P. M. cloudless afterwards.                   |
| 31    | 137.0                 | ...                             | N. W. & N.                        | Cloudless till 2 A. M. Scatd. i till 6 P. M. cloudless afterwards.                    |



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in the month of October, 1861.*

MONTHLY RESULTS.

|                                                               | Inches |
|---------------------------------------------------------------|--------|
| Mean height of the Barometer for the month, ..                | 29.802 |
| Max. height of the Barometer occurred at 9 A. M. on the 22nd, | 30.049 |
| Min. height of the Barometer occurred at 5 P. M. on the 5th,  | 29.523 |
| <i>Extreme range</i> of the Barometer during the month, ..    | 0.526  |
| Mean of the Daily Max. Pressures,                             | 29.867 |
| Ditto ditto Min. ditto, ..                                    | 29.746 |
| <i>Mean daily range</i> of the Barometer during the month,    | 0.121  |

|                                                              | °    |
|--------------------------------------------------------------|------|
| Mean Dry Bulb Thermometer for the month,                     | 81.2 |
| Max. Temperature occurred at 2 P. M. on the 4th,             | 90.0 |
| Min. Temperature occurred at 6 A. M. on the 26th,            | 73.0 |
| <i>Extreme range</i> of the Temperature during the month,    | 17.0 |
| Mean of the daily Max. Temperature, ..                       | 86.2 |
| Ditto ditto Min. ditto, ..                                   | 77.1 |
| <i>Mean daily range</i> of the Temperature during the month, | 9.1  |
| Mean Wet Bulb Thermometer for the month, ..                  | 77.3 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,   | 3.9  |
| Computed Mean Dew-point for the month, ..                    | 75.3 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,     | 5.9  |

|                                             | Inches |
|---------------------------------------------|--------|
| Mean Elastic force of Vapour for the month, | 0.862  |

|                                                                         | Troy grains |
|-------------------------------------------------------------------------|-------------|
| Mean Weight of Vapour for the month,                                    | 9.29        |
| Additional Weight of Vapour required for complete saturation,           | 1.92        |
| Mean degree of humidity for the month, complete saturation being unity, | 0.83        |

|                                                    | Inches  |
|----------------------------------------------------|---------|
| Rained 14 days, Max. fall of rain during 24 hours, | 3.64    |
| Total amount of rain during the month,             | 7.75    |
| Prevailing direction of the Wind, ..               | N. & S. |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of October, 1861.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 6            |          | 1     |          | 4  |          | 1     |          | 8  | 1        | 1     |          | 2  |          | 1     |          | 2     |          | 1       |
| 1         | 7            |          | 1     |          | 5  | 1        | 1     |          | 8  | 1        | 1     |          | 2  |          | 1     |          | 1     |          | 2       |
| 2         | 8            |          | 1     |          | 5  |          | 1     |          | 6  | 1        | 1     |          | 1  |          | 1     |          | 1     |          | 1       |
| 3         | 8            |          | 1     |          | 5  | 1        | 1     |          | 7  | 1        | 1     |          | 1  |          | 1     |          | 1     |          | 1       |
| 4         | 7            |          | 1     |          | 5  | 1        | 3     |          | 4  | 1        | 1     |          | 1  |          | 1     |          | 1     |          | 3       |
| 5         | 7            |          | 1     |          | 5  | 1        | 3     |          | 4  |          | 2     |          | 1  |          | 1     |          |       |          | 3       |
| 6         | 7            |          | 1     |          | 5  |          | 3     |          | 5  | 3        | 1     |          | 3  |          | 2     |          |       |          |         |
| 7         | 4            |          | 2     |          | 6  |          | 3     | 1        | 4  | 1        | 2     |          | 4  |          | 2     |          |       |          |         |
| 8         | 5            |          | 2     |          | 3  |          | 3     | 1        | 3  | 2        | 2     |          | 3  |          | 1     |          |       |          | 5       |
| 9         | 8            |          | 2     |          | 3  |          | 5     |          | 4  | 2        | 2     |          | 3  |          |       |          |       |          |         |
| 10        | 5            |          | 3     |          | 6  |          | 2     |          | 5  | 1        | 1     |          | 3  |          | 2     |          |       |          |         |
| 11        | 5            |          | 3     | 1        | 4  |          | 1     |          | 7  | 3        |       |          | 2  |          | 5     |          |       |          |         |
| Noon.     | 4            |          | 1     | 1        | 3  | 1        | 2     |          | 7  | 1        |       |          | 6  | 1        | 4     |          |       |          |         |
| 1         | 2            |          | 1     |          | 6  | 1        |       |          | 6  |          | 1     |          | 5  | 2        | 6     | 1        |       |          |         |
| 2         | 3            |          | 3     | 1        | 2  |          | 2     |          | 6  | 1        |       |          | 4  |          | 6     | 1        |       |          |         |
| 3         | 3            |          | 4     | 1        | 4  |          |       |          | 6  |          | 1     |          | 5  | 1        | 4     | 1        |       |          |         |
| 4         | 6            | 1        | 1     |          | 2  |          | 1     |          | 4  |          | 1     |          | 4  |          | 2     |          |       |          | 6       |
| 5         | 9            | 1        | 1     |          | 1  |          | 1     |          | 5  |          | 2     |          | 5  |          | 2     |          |       |          | 1       |
| 6         | 9            |          | 2     |          | 3  | 1        | 1     |          | 5  |          |       |          | 4  |          | 2     |          |       |          |         |
| 7         | 7            |          | 2     |          | 4  | 2        | 1     |          | 5  | 1        | 1     |          | 4  |          | 3     |          |       |          |         |
| 8         | 7            |          | 1     |          | 5  | 2        | 1     |          | 6  | 1        | 1     |          | 5  |          | 1     |          |       |          |         |
| 9         | 7            |          | 1     |          | 5  | 2        | 1     |          | 6  | 1        | 1     |          | 5  |          | 1     |          |       |          |         |
| 10        | 7            |          | 1     |          | 4  | 1        | 1     |          | 6  | 1        |       |          | 5  |          | 1     |          |       |          | 1       |
| 11        | 7            |          | 1     |          | 4  | 1        | 1     |          | 4  |          | 1     |          | 5  |          | 1     |          |       |          | 3       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.853                                          | 29.919                                    | 29.807  | 0.112   | 81.3                          | 87.4                                          | 76.4 | 11.0  |
| 2     | .890                                            | .947                                      | .852    | .095    | 79.7                          | 87.6                                          | 74.4 | 13.2  |
| 3     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 4     | .842                                            | .904                                      | .780    | .124    | 77.9                          | 83.0                                          | 73.8 | 9.2   |
| 5     | .835                                            | .894                                      | .775    | .119    | 79.4                          | 84.8                                          | 74.8 | 10.0  |
| 6     | .844                                            | .910                                      | .778    | .132    | 80.4                          | 87.0                                          | 75.8 | 11.2  |
| 7     | .847                                            | .917                                      | .795    | .122    | 78.6                          | 82.4                                          | 76.8 | 5.6   |
| 8     | .829                                            | .898                                      | .775    | .123    | 78.4                          | 81.0                                          | 76.4 | 4.6   |
| 9     | .828                                            | .885                                      | .781    | .104    | 78.4                          | 84.6                                          | 75.6 | 9.0   |
| 10    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 11    | .847                                            | .908                                      | .792    | .116    | 74.6                          | 77.0                                          | 72.2 | 4.8   |
| 12    | .855                                            | .912                                      | .817    | .095    | 73.7                          | 76.4                                          | 71.3 | 5.1   |
| 13    | .873                                            | .947                                      | .825    | .122    | 74.6                          | 80.0                                          | 70.6 | 9.4   |
| 14    | .858                                            | .909                                      | .812    | .097    | 75.5                          | 81.4                                          | 69.6 | 11.8  |
| 15    | .837                                            | .901                                      | .795    | .106    | 73.5                          | 75.6                                          | 70.6 | 5.0   |
| 16    | .850                                            | .914                                      | .810    | .104    | 75.5                          | 80.0                                          | 72.4 | 7.6   |
| 17    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 18    | .925                                            | .997                                      | .878    | .119    | 76.0                          | 81.4                                          | 72.0 | 9.4   |
| 19    | .945                                            | 30.009                                    | .905    | .104    | 72.5                          | 78.4                                          | 68.0 | 10.4  |
| 20    | .957                                            | .013                                      | .917    | .096    | 71.4                          | 78.8                                          | 66.8 | 12.0  |
| 21    | .988                                            | .048                                      | .946    | .102    | 70.0                          | 77.2                                          | 64.8 | 12.4  |
| 22    | 30.006                                          | .069                                      | .963    | .106    | 70.1                          | 78.4                                          | 63.2 | 15.2  |
| 23    | .013                                            | .071                                      | .968    | .103    | 69.9                          | 78.0                                          | 63.4 | 14.6  |
| 24    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 25    | .017                                            | .083                                      | .972    | .111    | 69.0                          | 77.4                                          | 62.8 | 14.6  |
| 26    | .034                                            | .103                                      | .993    | .110    | 67.6                          | 75.8                                          | 62.2 | 13.6  |
| 27    | .045                                            | .117                                      | 30.001  | .116    | 66.7                          | 74.4                                          | 60.0 | 14.4  |
| 28    | .019                                            | .090                                      | 29.952  | .138    | 66.1                          | 73.6                                          | 59.0 | 14.6  |
| 29    | .014                                            | .073                                      | .974    | .099    | 66.6                          | 75.4                                          | 59.6 | 15.8  |
| 30    | .067                                            | .144                                      | 30.017  | .127    | 65.6                          | 73.7                                          | 57.8 | 15.9  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 75.4                            | 5.9                 | 72.4                | 8.9                          | 0.785                            | 8.45                                             | 2.79                                                                    | 0.75                                                              |
| 2     | 73.6                            | 6.1                 | 70.5                | 9.2                          | .739                             | 7.98                                             | .74                                                                     | .74                                                               |
| 3     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 4     | 73.7                            | 4.2                 | 71.6                | 6.3                          | .766                             | 8.30                                             | 1.86                                                                    | .82                                                               |
| 5     | 76.0                            | 3.4                 | 74.3                | 5.1                          | .835                             | 9.03                                             | .59                                                                     | .85                                                               |
| 6     | 76.3                            | 4.1                 | 74.2                | 6.2                          | .832                             | 8.98                                             | .96                                                                     | .82                                                               |
| 7     | 75.9                            | 2.7                 | 74.5                | 4.1                          | .840                             | 9.11                                             | .27                                                                     | .88                                                               |
| 8     | 75.9                            | 2.5                 | 74.6                | 3.8                          | .843                             | .13                                              | .18                                                                     | .89                                                               |
| 9     | 76.0                            | 2.4                 | 74.8                | 3.6                          | .849                             | .19                                              | .12                                                                     | .89                                                               |
| 10    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 11    | 72.4                            | 2.2                 | 71.3                | 3.3                          | .758                             | 8.28                                             | 0.92                                                                    | .90                                                               |
| 12    | 71.4                            | 2.3                 | 70.2                | 3.5                          | .732                             | 7.99                                             | 0.97                                                                    | .89                                                               |
| 13    | 70.3                            | 4.3                 | 68.1                | 6.5                          | .684                             | .44                                              | 1.76                                                                    | .81                                                               |
| 14    | 70.2                            | 5.3                 | 67.5                | 8.0                          | .670                             | .30                                              | 2.16                                                                    | .77                                                               |
| 15    | 71.2                            | 2.3                 | 70.0                | 3.5                          | .727                             | .94                                              | 0.96                                                                    | .89                                                               |
| 16    | 72.2                            | 3.3                 | 70.5                | 5.0                          | .739                             | 8.05                                             | 1.41                                                                    | .85                                                               |
| 17    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 18    | 70.1                            | 5.9                 | 67.1                | 8.9                          | .661                             | 7.19                                             | 2.41                                                                    | .75                                                               |
| 19    | 66.2                            | 6.3                 | 63.0                | 9.5                          | .578                             | 6.32                                             | .31                                                                     | .73                                                               |
| 20    | 66.0                            | 5.4                 | 63.3                | 8.1                          | .584                             | .41                                              | 1.94                                                                    | .77                                                               |
| 21    | 64.1                            | 5.9                 | 61.1                | 8.9                          | .541                             | 5.97                                             | 2.03                                                                    | .75                                                               |
| 22    | 63.5                            | 6.6                 | 60.2                | 9.9                          | .527                             | .79                                              | .24                                                                     | .72                                                               |
| 23    | 64.4                            | 5.5                 | 61.6                | 8.3                          | .552                             | 6.07                                             | 1.91                                                                    | .76                                                               |
| 24    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 25    | 62.9                            | 6.1                 | 59.8                | 9.2                          | .520                             | 5.73                                             | 2.03                                                                    | .74                                                               |
| 26    | 62.0                            | 5.6                 | 58.6                | 9.0                          | .499                             | .52                                              | 1.92                                                                    | .74                                                               |
| 27    | 60.8                            | 5.9                 | 57.3                | 9.4                          | .478                             | .29                                              | .94                                                                     | .73                                                               |
| 28    | 60.4                            | 5.7                 | 57.0                | 9.1                          | .473                             | .24                                              | .86                                                                     | .74                                                               |
| 29    | 61.1                            | 5.5                 | 57.8                | 8.8                          | .486                             | .38                                              | .83                                                                     | .75                                                               |
| 30    | 59.7                            | 5.9                 | 56.2                | 9.4                          | .461                             | .12                                              | .88                                                                     | .73                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.923                                          | 30.047                                                       | 29.822  | 0.225   | 71.3                          | 79.0                                                                | 62.4 | 16.6  |
| 1              | .909                                            | .042                                                         | .812    | .230    | 71.2                          | 78.4                                                                | 61.9 | 16.5  |
| 2              | .898                                            | .037                                                         | .803    | .234    | 70.9                          | 78.2                                                                | 61.2 | 17.0  |
| 3              | .897                                            | .031                                                         | .791    | .240    | 70.1                          | 77.6                                                                | 60.2 | 17.4  |
| 4              | .898                                            | .017                                                         | .795    | .222    | 69.4                          | 77.0                                                                | 59.5 | 17.5  |
| 5              | .909                                            | .022                                                         | .803    | .219    | 69.2                          | 76.9                                                                | 58.8 | 18.1  |
| 6              | .922                                            | .053                                                         | .818    | .235    | 69.0                          | 77.0                                                                | 57.8 | 19.2  |
| 7              | .940                                            | .075                                                         | .841    | .234    | 69.2                          | 77.4                                                                | 57.8 | 19.6  |
| 8              | .966                                            | .113                                                         | .861    | .252    | 71.3                          | 79.4                                                                | 63.0 | 16.4  |
| 9              | .981                                            | .144                                                         | .882    | .262    | 73.3                          | 81.3                                                                | 67.0 | 14.3  |
| 10             | .981                                            | .136                                                         | .885    | .251    | 74.8                          | 82.8                                                                | 68.2 | 14.6  |
| 11             | .960                                            | .120                                                         | .866    | .254    | 76.7                          | 85.2                                                                | 70.4 | 14.8  |
| Noon.          | .936                                            | .086                                                         | .838    | .248    | 77.9                          | 85.4                                                                | 71.8 | 13.6  |
| 1              | .909                                            | .070                                                         | .816    | .254    | 78.6                          | 86.4                                                                | 73.0 | 13.4  |
| 2              | .888                                            | .044                                                         | .789    | .255    | 79.4                          | 87.4                                                                | 73.6 | 13.8  |
| 3              | .878                                            | .029                                                         | .775    | .254    | 79.1                          | 87.6                                                                | 73.6 | 14.0  |
| 4              | .873                                            | .019                                                         | .777    | .242    | 78.0                          | 86.2                                                                | 72.2 | 14.0  |
| 5              | .884                                            | .036                                                         | .779    | .257    | 76.8                          | 85.0                                                                | 69.8 | 15.2  |
| 6              | .893                                            | .056                                                         | .785    | .271    | 74.9                          | 82.8                                                                | 67.0 | 15.8  |
| 7              | .910                                            | .070                                                         | .808    | .262    | 73.9                          | 81.8                                                                | 66.0 | 15.8  |
| 8              | .925                                            | .082                                                         | .828    | .254    | 73.1                          | 81.3                                                                | 65.0 | 16.3  |
| 9              | .934                                            | .092                                                         | .848    | .244    | 72.4                          | 79.8                                                                | 64.0 | 15.8  |
| 10             | .939                                            | .097                                                         | .845    | .252    | 71.8                          | 79.2                                                                | 63.4 | 15.8  |
| 11             | .939                                            | .090                                                         | .840    | .250    | 71.0                          | 78.6                                                                | 62.4 | 16.2  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

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taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 68.5                            | 2.8                 | 67.1                | 4.2                          | 0.661                            | 7.26                                                  | 1.07                                                                     | 0.87                                                                 |
| 1              | 68.4                            | 2.8                 | 67.0                | 4.2                          | .659                             | .24                                                   | .06                                                                      | .87                                                                  |
| 2              | 68.2                            | 2.7                 | 66.8                | 4.1                          | .655                             | .20                                                   | .03                                                                      | .88                                                                  |
| 3              | 67.4                            | 2.7                 | 66.0                | 4.1                          | .638                             | .02                                                   | .01                                                                      | .88                                                                  |
| 4              | 66.6                            | 2.8                 | 65.2                | 4.2                          | .621                             | 6.85                                                  | .01                                                                      | .87                                                                  |
| 5              | 66.5                            | 2.7                 | 65.1                | 4.1                          | .619                             | .83                                                   | 0.98                                                                     | .88                                                                  |
| 6              | 66.4                            | 2.6                 | 65.1                | 3.9                          | .619                             | .83                                                   | .93                                                                      | .88                                                                  |
| 7              | 66.6                            | 2.6                 | 65.3                | 3.9                          | .623                             | .87                                                   | .94                                                                      | .88                                                                  |
| 8              | 67.5                            | 3.8                 | 65.6                | 5.7                          | .630                             | .92                                                   | 1.41                                                                     | .83                                                                  |
| 9              | 68.4                            | 4.9                 | 65.9                | 7.4                          | .636                             | .96                                                   | .88                                                                      | .79                                                                  |
| 10             | 69.1                            | 5.7                 | 66.2                | 8.6                          | .642                             | .99                                                   | 2.27                                                                     | .76                                                                  |
| 11             | 69.8                            | 6.9                 | 66.3                | 10.4                         | .644                             | 7.01                                                  | .79                                                                      | .72                                                                  |
| Noon.          | 70.1                            | 7.8                 | 66.2                | 11.7                         | .642                             | 6.95                                                  | 3.21                                                                     | .68                                                                  |
| 1              | 70.4                            | 8.2                 | 66.3                | 12.3                         | .644                             | .98                                                   | .40                                                                      | .67                                                                  |
| 2              | 70.7                            | 8.7                 | 66.3                | 13.1                         | .644                             | .96                                                   | .66                                                                      | .66                                                                  |
| 3              | 70.7                            | 8.4                 | 66.5                | 12.6                         | .648                             | 7.00                                                  | .53                                                                      | .67                                                                  |
| 4              | 70.4                            | 7.6                 | 66.6                | 11.4                         | .651                             | .05                                                   | .14                                                                      | .69                                                                  |
| 5              | 70.3                            | 6.5                 | 67.0                | 9.8                          | .659                             | .15                                                   | 2.68                                                                     | .73                                                                  |
| 6              | 70.4                            | 4.5                 | 68.1                | 6.8                          | .486                             | .44                                                   | 1.84                                                                     | .80                                                                  |
| 7              | 70.0                            | 3.9                 | 68.0                | 5.9                          | .681                             | .44                                                   | .57                                                                      | .83                                                                  |
| 8              | 69.6                            | 3.5                 | 67.8                | 5.3                          | .677                             | .41                                                   | .38                                                                      | .84                                                                  |
| 9              | 69.3                            | 3.1                 | 67.7                | 4.7                          | .674                             | .39                                                   | .21                                                                      | .86                                                                  |
| 10             | 68.8                            | 3.0                 | 67.3                | 4.5                          | .666                             | .30                                                   | .15                                                                      | .86                                                                  |
| 11             | 68.1                            | 2.9                 | 66.6                | 4.4                          | .651                             | .15                                                   | .10                                                                      | .87                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                               |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                          |
| 1     | 144.0                 | ...                             | N. W. & N.                        | Scatd. \i till 8 A. M. cloudless afterwards.                                             |
| 2     | 130.0                 | ...                             | N. & N. W.                        | Cloudless till 6 A. M. Scatd. \i afterwards.                                             |
| 3     | <i>Sunday.</i>        | ...                             |                                   |                                                                                          |
| 4     | ...                   | 0.17                            | N. E. & N. W.                     | Cloudy; also drizzling at 3 & 4 P. M.                                                    |
| 5     | 135.0                 | ...                             | N. & E.                           | Scatd. clouds till 7 P. M. cloudless afterwards; also slightly drizzling at 7 P. M.      |
| 6     | 139.5                 | ...                             | E. & N. E.                        | Scatd. \i till 11 A. M. Scatd. clouds till 8 P. M. cloudless afterwards.                 |
| 7     | ...                   | ...                             | N. E. & E.                        | Cloudy; also slightly drizzling at 1 P. M.                                               |
| 8     | ...                   | 0.43                            | E. & S.                           | Cloudy; also raining between Noon & 1 P. M.                                              |
| 9     | ...                   | 1.31                            | N. & E.                           | Cloudy; also constantly raining.                                                         |
| 10    | <i>Sunday.</i>        | 0.61                            |                                   |                                                                                          |
| 11    | ...                   | 1.02                            | N. E. & N.                        | Cloudy; also constantly raining between 1 & 10 A. M.                                     |
| 12    | ...                   | 0.26                            | N. E. & N.                        | Cloudy till 8 P. M. cloudless afterwards; also constantly drizzling between 3 & 11 A. M. |
| 13    | 129.0                 | ...                             | N.                                | Cloudless till 4 A. M. Scatd. \i till 6 P. M. cloudless afterwards.                      |
| 14    | 127.0                 | ...                             | N.                                | Cloudless till 1 P. M. cloudy afterwards.                                                |
| 15    | ...                   | 0.40                            | N.                                | Cloudy; also constantly drizzling between 2 A. M. & 3 P. M.                              |
| 16    | 128.0                 | 0.19                            | N. & N. E.                        | Cloudy; also drizzling at 5 & 8 A. M.                                                    |
| 17    | <i>Sunday.</i>        | ...                             |                                   |                                                                                          |
| 18    | 139.4                 | ...                             | N. & N. W.                        | Cloudy till 10 A. M. cloudless afterwards.                                               |
| 19    | ...                   | ...                             | N. & N. W.                        | Cloudless.                                                                               |
| 20    | 137.2                 | ...                             | N. & N. W.                        | Cloudless.                                                                               |
| 21    | 136.7                 | ...                             | N. & W. & E.                      | Cloudless.                                                                               |
| 22    | 138.2                 | ...                             | N. W. & N.                        | Cloudless.                                                                               |
| 23    | 134.0                 | ...                             | N.                                | Cloudless.                                                                               |
| 24    | <i>Sunday.</i>        | ...                             |                                   |                                                                                          |
| 25    | 137.0                 | ...                             | N. & W.                           | Cloudless.                                                                               |
| 26    | 132.0                 | ...                             | N. W. & N. & W.                   | Cloudless.                                                                               |
| 27    | 134.5                 | ...                             | W. & N. W. & N. E.                | Cloudless.                                                                               |
| 28    | 134.6                 | ...                             | N. W. & N. & W.                   | Cloudless.                                                                               |
| 29    | 135.0                 | ...                             | N. & S. W.                        | Cloudless.                                                                               |
| 30    | 130.0                 | ...                             | N.                                | Cloudless.                                                                               |

\i Cirri, \i Cirro strati, \i Cumuli, \i Cumulo strati, \i Nimbi, —i Strati, \i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1861.*

MONTHLY RESULTS.

|                                                                    |    |    | Inches |
|--------------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                        | .. | .. | 29.921 |
| Max. height of the Barometer occurred at 9 A. M. on the 30th,      | .. | .. | 30.144 |
| Min. height of the Barometer occurred at 3 P. M. on the 5th & 8th, | .. | .. | 29.775 |
| <i>Extreme range</i> of the Barometer during the month,            | .. | .. | 0.369  |
| Mean of the daily Max. Pressures,                                  | .. | .. | 29.984 |
| Ditto ditto Min. ditto,                                            | .. | .. | 29.872 |
| <i>Mean daily range</i> of the Barometer during the month,         | .. | .. | 0.112  |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 73.5 |
| Max. Temperature occurred at 3 P. M. on the 2nd,             | .. | .. | 87.6 |
| Min. Temperature occurred at 6 & 7 A. M. on the 30th,        | .. | .. | 57.8 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 29.8 |
| Mean of the daily Max. Temperature,                          | .. | .. | 79.6 |
| Ditto ditto Min. ditto,                                      | .. | .. | 68.9 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 10.7 |

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|                                                            |    |    | °      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 68.9   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 4.6    |
| Computed Mean Dew-point for the month,                     | .. | .. | 66.6   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 6.9    |
|                                                            |    |    | Inches |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.651  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 7.11        |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 1.79        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.80        |

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|                                                    |    |    | Inches     |
|----------------------------------------------------|----|----|------------|
| Rained 10 days, Max. fall of rain during 24 hours, | .. | .. | 1.31       |
| Total amount of rain during the month,             | .. | .. | 4.39       |
| Prevailing direction of the Wind,                  | .. | .. | N. & N. W. |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of November, 1861.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 15           |          | 2     |          | 4  |          |       |          |    |          |       |          |    |          | 3     |          |       |          | 2       |
| 1         | 17           |          | 2     | 1        | 4  |          |       |          |    |          |       |          |    |          | 3     |          |       |          |         |
| 2         | 16           | 1        | 2     | 1        | 4  |          |       |          |    |          |       |          |    |          | 3     |          |       |          | 1       |
| 3         | 17           | 2        | 1     |          | 4  |          |       |          |    |          |       |          |    |          | 3     |          |       |          | 1       |
| 4         | 14           | 2        | 2     | 1        | 4  |          |       |          |    |          |       |          |    |          | 3     |          |       |          | 3       |
| 5         | 13           | 3        | 2     | 1        | 2  |          | 1     | 1        |    |          |       |          |    |          | 2     |          |       |          | 6       |
| 6         | 14           | 2        | 2     |          | 2  |          | 1     | 1        |    |          | 1     |          | 2  |          | 4     |          |       |          |         |
| 7         | 14           | 2        | 2     |          | 2  |          | 1     | 1        |    |          | 1     |          | 2  |          | 4     |          |       |          |         |
| 8         | 13           | 2        | 4     | 1        | 1  |          | 1     | 1        |    |          | 1     |          | 3  |          | 3     |          |       |          |         |
| 9         | 14           | 1        | 3     |          | 3  |          |       |          |    |          | 1     |          | 2  |          | 3     |          |       |          |         |
| 10        | 14           | 2        | 4     |          | 2  |          |       |          |    |          | 1     |          | 2  |          | 3     |          |       |          |         |
| 11        | 13           | 2        | 5     | 1        | 2  |          |       |          |    |          | 1     |          | 1  |          | 3     |          |       |          | 1       |
| Noon.     | 10           | 2        | 3     |          | 3  | 1        |       |          |    |          | 1     |          | 2  |          | 7     |          |       |          |         |
| 1         | 7            | 1        | 4     |          | 3  | 2        |       |          |    |          | 1     |          | 5  |          | 6     |          |       |          | 1       |
| 2         | 8            |          | 3     |          | 3  |          |       |          |    |          | 1     |          | 4  |          | 6     |          |       |          |         |
| 3         | 8            | 1        | 3     | 1        | 2  |          | 1     |          |    |          | 1     |          | 3  |          | 8     |          |       |          | 1       |
| 4         | 9            |          | 4     |          | 1  | 1        |       |          | 1  |          | 1     |          | 1  |          | 8     |          |       |          | 1       |
| 5         | 11           |          | 5     |          | 1  |          |       |          | 1  |          | 1     |          | 1  |          | 5     |          |       |          | 1       |
| 6         | 11           |          | 6     |          | 2  |          |       |          | 1  |          | 1     |          | 2  |          | 4     |          |       |          |         |
| 7         | 11           |          | 6     | 1        | 2  | 1        |       |          | 1  |          | 1     |          | 3  |          | 3     |          |       |          |         |
| 8         | 10           |          | 7     | 1        | 2  |          |       |          | 1  |          | 1     |          | 3  |          | 3     |          |       |          |         |
| 9         | 9            |          | 6     |          | 4  | 1        |       |          | 1  |          | 1     |          | 3  |          | 3     |          |       |          |         |
| 10        | 10           |          | 4     |          | 4  | 1        |       |          | 1  |          | 1     |          | 3  |          | 3     |          |       |          | 1       |
| 11        | 10           |          | 5     |          | 2  |          |       |          | 1  |          |       |          | 3  |          | 3     |          |       |          | 2       |





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1861.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                        | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 2     | 30.042                                         | 30.111                                    | 29.987  | 0.124   | 65.8                          | 74.5                                          | 59.2 | 15.3  |
| 3     | .033                                           | .097                                      | .973    | .124    | 66.7                          | 74.2                                          | 60.2 | 14.0  |
| 4     | .047                                           | .116                                      | 30.003  | .113    | 67.1                          | 75.4                                          | 60.8 | 14.6  |
| 5     | .067                                           | .132                                      | .012    | .120    | 67.1                          | 75.6                                          | 60.2 | 15.4  |
| 6     | .093                                           | .164                                      | .042    | .122    | 66.9                          | 75.4                                          | 59.6 | 15.8  |
| 7     | .046                                           | .124                                      | 29.968  | .156    | 67.5                          | 75.4                                          | 60.6 | 14.8  |
| 8     | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 9     | .009                                           | .075                                      | .963    | .112    | 69.6                          | 79.4                                          | 61.8 | 17.6  |
| 10    | .003                                           | .096                                      | .951    | .145    | 70.5                          | 76.6                                          | 66.0 | 10.6  |
| 11    | 29.955                                         | .008                                      | .902    | .106    | 70.6                          | 76.8                                          | 65.6 | 11.2  |
| 12    | .956                                           | .026                                      | .904    | .122    | 67.1                          | 73.9                                          | 62.8 | 11.1  |
| 13    | .961                                           | .025                                      | .923    | .102    | 65.3                          | 73.2                                          | 58.6 | 14.6  |
| 14    | .978                                           | .064                                      | .923    | .141    | 65.2                          | 73.0                                          | 58.4 | 14.6  |
| 15    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 16    | .910                                           | 29.957                                    | .850    | .107    | 68.1                          | 74.1                                          | 63.4 | 10.7  |
| 17    | .940                                           | 30.027                                    | .890    | .137    | 66.5                          | 73.0                                          | 62.2 | 10.8  |
| 18    | .950                                           | .024                                      | .890    | .134    | 66.0                          | 73.8                                          | 60.8 | 13.0  |
| 19    | .967                                           | .022                                      | .921    | .101    | 65.7                          | 73.8                                          | 59.6 | 14.2  |
| 20    | .980                                           | .039                                      | .938    | .101    | 65.0                          | 73.4                                          | 58.8 | 14.6  |
| 21    | 30.044                                         | .123                                      | .965    | .158    | 66.0                          | 73.2                                          | 58.9 | 14.3  |
| 22    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 23    | 29.994                                         | .064                                      | .947    | .117    | 65.3                          | 72.6                                          | 58.8 | 13.8  |
| 24    | .997                                           | .070                                      | .952    | .118    | 64.8                          | 73.2                                          | 57.4 | 15.8  |
| 25    | 30.005                                         | .070                                      | .955    | .115    | 64.4                          | 73.6                                          | 57.8 | 15.8  |
| 26    | .019                                           | .088                                      | .971    | .117    | 65.1                          | 74.8                                          | 57.0 | 17.8  |
| 27    | .047                                           | .118                                      | 30.004  | .114    | 64.1                          | 73.4                                          | 56.8 | 16.6  |
| 28    | .021                                           | .091                                      | 29.969  | .122    | 65.6                          | 74.7                                          | 57.2 | 17.5  |
| 29    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                               |      |       |
| 30    | .065                                           | .122                                      | 30.010  | .112    | 67.4                          | 75.6                                          | 61.4 | 14.2  |
| 31    | .077                                           | .152                                      | .013    | .139    | 66.2                          | 74.2                                          | 60.4 | 13.8  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1861.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 2     | 61.1                            | 4.7                 | 58.3                | 7.5                          | 0.494                            | 5.47                                             | 1.57                                                                    | 0.78                                                                |
| 3     | 61.9                            | 4.8                 | 59.0                | 7.7                          | .506                             | .60                                              | .63                                                                     | .78                                                                 |
| 4     | 62.3                            | 4.8                 | 59.4                | 7.7                          | .513                             | .67                                              | .65                                                                     | .78                                                                 |
| 5     | 62.1                            | 5.0                 | 59.1                | 8.0                          | .508                             | .62                                              | .70                                                                     | .77                                                                 |
| 6     | 62.2                            | 4.7                 | 59.4                | 7.5                          | .513                             | .67                                              | .61                                                                     | .78                                                                 |
| 7     | 62.8                            | 4.7                 | 60.0                | 7.5                          | .523                             | .78                                              | .64                                                                     | .78                                                                 |
| 8     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 9     | 64.9                            | 4.7                 | 62.5                | 7.1                          | .568                             | 6.26                                             | .64                                                                     | .79                                                                 |
| 10    | 66.4                            | 4.1                 | 64.3                | 6.2                          | .603                             | .64                                              | .49                                                                     | .82                                                                 |
| 11    | 67.4                            | 3.2                 | 65.8                | 4.8                          | .634                             | .97                                              | .18                                                                     | .86                                                                 |
| 12    | 62.0                            | 5.1                 | 58.9                | 8.2                          | .504                             | 5.58                                             | .74                                                                     | .76                                                                 |
| 13    | 60.1                            | 5.2                 | 57.0                | 8.3                          | .473                             | .25                                              | .68                                                                     | .76                                                                 |
| 14    | 60.6                            | 4.6                 | 57.8                | 7.4                          | .486                             | .40                                              | .51                                                                     | .78                                                                 |
| 15    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 16    | 65.1                            | 3.0                 | 63.3                | 4.8                          | .584                             | 6.44                                             | .11                                                                     | .85                                                                 |
| 17    | 62.9                            | 3.6                 | 60.7                | 5.8                          | .536                             | 5.93                                             | .26                                                                     | .83                                                                 |
| 18    | 61.2                            | 4.8                 | 58.3                | 7.7                          | .494                             | .47                                              | .61                                                                     | .77                                                                 |
| 19    | 60.0                            | 5.7                 | 56.6                | 9.1                          | .467                             | .18                                              | .84                                                                     | .74                                                                 |
| 20    | 59.9                            | 5.1                 | 56.8                | 8.2                          | .470                             | .23                                              | .64                                                                     | .76                                                                 |
| 21    | 60.4                            | 5.6                 | 57.0                | 9.0                          | .473                             | .24                                              | .84                                                                     | .74                                                                 |
| 22    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 23    | 60.3                            | 5.0                 | 57.3                | 8.0                          | .478                             | .30                                              | .63                                                                     | .77                                                                 |
| 24    | 59.3                            | 5.5                 | 56.0                | 8.8                          | .458                             | .09                                              | .74                                                                     | .75                                                                 |
| 25    | 58.6                            | 5.8                 | 54.5                | 9.9                          | .435                             | 4.84                                             | .90                                                                     | .72                                                                 |
| 26    | 59.1                            | 6.0                 | 55.5                | 9.6                          | .450                             | 5.00                                             | .89                                                                     | .73                                                                 |
| 27    | 58.9                            | 5.2                 | 55.3                | 8.8                          | .447                             | 4.98                                             | .69                                                                     | .75                                                                 |
| 28    | 60.2                            | 5.4                 | 57.0                | 8.6                          | .473                             | 5.24                                             | .76                                                                     | .75                                                                 |
| 29    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 30    | 62.4                            | 5.0                 | 59.4                | 8.0                          | .513                             | .67                                              | .72                                                                     | .77                                                                 |
| 31    | 60.8                            | 5.4                 | 57.6                | 8.6                          | .483                             | .34                                              | .78                                                                     | .75                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
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in the month of December, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                              | o    | o     |
| Mid-<br>night. | 30.013                                          | 30.089                                                       | 29.916  | 0.173   | 63.5                          | 68.8                                                           | 60.0 | 8.8   |
| 1              | .002                                            | .089                                                         | .910    | .179    | 62.8                          | 68.4                                                           | 59.2 | 9.2   |
| 2              | 29.991                                          | .081                                                         | .901    | .180    | 62.2                          | 67.6                                                           | 58.6 | 9.0   |
| 3              | .983                                            | .076                                                         | .890    | .186    | 61.5                          | 67.2                                                           | 58.0 | 9.2   |
| 4              | .983                                            | .073                                                         | .887    | .186    | 61.0                          | 66.8                                                           | 57.6 | 9.2   |
| 5              | .986                                            | .095                                                         | .902    | .193    | 60.6                          | 66.0                                                           | 57.0 | 9.0   |
| 6              | 30.007                                          | .102                                                         | .918    | .184    | 60.3                          | 66.0                                                           | 56.8 | 9.2   |
| 7              | .026                                            | .130                                                         | .930    | .200    | 60.4                          | 66.2                                                           | 57.2 | 9.0   |
| 8              | .054                                            | .144                                                         | .953    | .191    | 63.1                          | 68.2                                                           | 59.4 | 8.8   |
| 9              | .075                                            | .162                                                         | .951    | .211    | 65.9                          | 70.3                                                           | 62.8 | 7.5   |
| 10             | .075                                            | .164                                                         | .953    | .211    | 68.0                          | 72.8                                                           | 64.5 | 8.3   |
| 11             | .055                                            | .143                                                         | .947    | .196    | 70.7                          | 74.0                                                           | 68.4 | 5.6   |
| Noon.          | .029                                            | .122                                                         | .908    | .214    | 72.5                          | 76.4                                                           | 70.2 | 6.2   |
| 1              | 29.998                                          | .077                                                         | .885    | .192    | 73.6                          | 78.2                                                           | 71.4 | 6.8   |
| 2              | .979                                            | .056                                                         | .857    | .199    | 74.4                          | 79.4                                                           | 72.6 | 6.8   |
| 3              | .965                                            | .045                                                         | .852    | .193    | 74.2                          | 79.0                                                           | 72.2 | 6.8   |
| 4              | .961                                            | .042                                                         | .850    | .192    | 72.8                          | 76.6                                                           | 71.0 | 5.6   |
| 5              | .967                                            | .045                                                         | .856    | .189    | 71.1                          | 74.8                                                           | 68.6 | 6.2   |
| 6              | .976                                            | .062                                                         | .870    | .192    | 68.9                          | 72.9                                                           | 66.4 | 6.5   |
| 7              | .993                                            | .078                                                         | .900    | .178    | 67.3                          | 71.4                                                           | 64.8 | 6.6   |
| 8              | 30.009                                          | .095                                                         | .915    | .180    | 66.1                          | 70.8                                                           | 63.6 | 7.2   |
| 9              | .021                                            | .102                                                         | .933    | .169    | 65.3                          | 69.8                                                           | 62.8 | 7.0   |
| 10             | .027                                            | .114                                                         | .927    | .187    | 64.6                          | 69.4                                                           | 61.8 | 7.6   |
| 11             | .022                                            | .114                                                         | .926    | .188    | 63.9                          | 69.0                                                           | 61.2 | 7.8   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1861.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 60.8                          | 2.7                 | 58.9                | 4.6                          | 0.504                            | 5.61                                                  | 0.94                                                                | 0.86                                                                |
| 1              | 60.2                          | 2.6                 | 58.4                | 4.4                          | .496                             | .54                                                   | .87                                                                 | .86                                                                 |
| 2              | 59.8                          | 2.4                 | 58.1                | 4.1                          | .491                             | .49                                                   | .80                                                                 | .87                                                                 |
| 3              | 59.2                          | 2.3                 | 57.6                | 3.9                          | .483                             | .40                                                   | .76                                                                 | .88                                                                 |
| 4              | 58.7                          | 2.3                 | 56.9                | 4.1                          | .472                             | .28                                                   | .78                                                                 | .87                                                                 |
| 5              | 58.4                          | 2.2                 | 56.6                | 4.0                          | .467                             | .24                                                   | .74                                                                 | .88                                                                 |
| 6              | 58.2                          | 2.1                 | 56.5                | 3.8                          | .465                             | .22                                                   | .71                                                                 | .88                                                                 |
| 7              | 58.4                          | 2.0                 | 56.8                | 3.6                          | .470                             | .27                                                   | .68                                                                 | .89                                                                 |
| 8              | 60.2                          | 2.9                 | 58.2                | 4.9                          | .493                             | .49                                                   | .98                                                                 | .85                                                                 |
| 9              | 61.5                          | 4.4                 | 58.9                | 7.0                          | .504                             | .59                                                   | 1.47                                                                | .79                                                                 |
| 10             | 62.4                          | 5.6                 | 59.0                | 9.0                          | .506                             | .59                                                   | .94                                                                 | .74                                                                 |
| 11             | 63.1                          | 7.6                 | 59.3                | 11.4                         | .511                             | .61                                                   | 2.57                                                                | .69                                                                 |
|                |                               |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| Noon.          | 63.6                          | 8.9                 | 59.1                | 13.4                         | .508                             | .56                                                   | 3.07                                                                | .64                                                                 |
| 1              | 64.1                          | 9.5                 | 59.3                | 14.3                         | .511                             | .58                                                   | .35                                                                 | .63                                                                 |
| 2              | 64.2                          | 10.2                | 59.1                | 15.3                         | .508                             | .54                                                   | .61                                                                 | .61                                                                 |
| 3              | 64.1                          | 10.1                | 59.0                | 15.2                         | .506                             | .52                                                   | .57                                                                 | .61                                                                 |
| 4              | 63.8                          | 9.0                 | 59.3                | 13.5                         | .511                             | .58                                                   | .13                                                                 | .64                                                                 |
| 5              | 63.9                          | 7.2                 | 60.3                | 10.8                         | .528                             | .80                                                   | 2.48                                                                | .70                                                                 |
| 6              | 63.9                          | 5.0                 | 61.4                | 7.5                          | .548                             | 6.04                                                  | 1.70                                                                | .78                                                                 |
| 7              | 63.0                          | 4.3                 | 60.4                | 6.9                          | .530                             | 5.87                                                  | .50                                                                 | .80                                                                 |
| 8              | 62.5                          | 3.6                 | 60.3                | 5.8                          | .528                             | .86                                                   | .24                                                                 | .83                                                                 |
| 9              | 62.0                          | 3.3                 | 60.0                | 5.3                          | .523                             | .81                                                   | .12                                                                 | .84                                                                 |
| 10             | 61.6                          | 3.0                 | 59.8                | 4.8                          | .520                             | .77                                                   | .01                                                                 | .85                                                                 |
| 11             | 61.0                          | 2.9                 | 59.0                | 4.9                          | .506                             | .63                                                   | .00                                                                 | .85                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1861.*

Solar Radiation, Weather, &c.

| Date.             | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                        |
|-------------------|-----------------------|---------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------|
|                   | o                     | Inches.                         |                                   |                                                                                                                   |
| 1 <i>Sunday.</i>  |                       |                                 |                                   |                                                                                                                   |
| 2                 | 136.7                 | ...                             | N.                                | Cloudless till 11 A. M. Scatd. \i & \i till 4 P. M. cloudless afterwards.                                         |
| 3                 | 131.4                 | ...                             | W. & N.                           | Cloudless till 8 A. M. Scatd. \i & \i till 5 P. M. cloudless afterwards.                                          |
| 4                 | 136.0                 | ...                             | N. & N. W.                        | Cloudless; also foggy after 8 P. M.                                                                               |
| 5                 | 135.0                 | ...                             | N.                                | Cloudless.                                                                                                        |
| 6                 | 130.0                 | ...                             | N. & N. E.                        | Cloudless.                                                                                                        |
| 7                 | 129.5                 | ...                             | N. & N. E. & N. W.                | Cloudless; also foggy after 7 P. M.                                                                               |
| 8 <i>Sunday.</i>  |                       |                                 |                                   |                                                                                                                   |
| 9                 | 139.4                 | ...                             | N. E. & S.                        | Cloudless.                                                                                                        |
| 10                | 129.0                 | ...                             | S. E. & E.                        | Scatd. \i.                                                                                                        |
| 11                | ...                   | ...                             | S. & W. & N.                      | Scatd. clouds; also slightly raining at 9 A. M.                                                                   |
| 12                | 136.4                 | ...                             | N. & N. W. & N. E.                | Scatd. \i till 3 A. M. cloudless afterwards.                                                                      |
| 13                | 135.0                 | ...                             | N.                                | Cloudless.*                                                                                                       |
| 14                | 133.0                 | ...                             | N.                                | Cloudless.                                                                                                        |
| 15 <i>Sunday.</i> |                       |                                 |                                   |                                                                                                                   |
| 16                | ...                   | 0.26                            | S. & N.                           | Cloudless till 4 P. M. cloudy till 5 P. M. cloudless afterwards; also raining between 11 A. M. & Noon.            |
| 17                | 132.0                 | ...                             | W. & S. W.                        | Scatd. \i till 4 A. M. cloudy till 10 A. M. Scatd. \i till 5 P. M. cloudless afterwards; also foggy after 8 P. M. |
| 18                | 131.4                 | ...                             | W. & N. E. & N. W.                | Cloudless.                                                                                                        |
| 19                | 134.0                 | ...                             | W. & S. W. & N. W.                | Cloudless.                                                                                                        |
| 20                | 130.6                 | ...                             | W. & N. W.                        | Cloudless.                                                                                                        |
| 21                | 131.2                 | ...                             | N. W. & N. & N. E.                | Cloudless; also foggy till 4 A. M.                                                                                |
| 22 <i>Sunday.</i> |                       |                                 |                                   |                                                                                                                   |
| 23                | 130.0                 | ...                             | W. & N. W.                        | Cloudless.                                                                                                        |
| 24                | 131.6                 | ...                             | N. W.                             | Cloudless.                                                                                                        |
| 25                | 134.8                 | ...                             | W.                                | Cloudless; also foggy after 8 P. M.                                                                               |
| 26                | 136.0                 | ...                             | N. & N. W. & S. W.                | Cloudless.                                                                                                        |
| 27                | 135.5                 | ...                             | W & E.                            | Cloudless.                                                                                                        |
| 28                | 134.0                 | ...                             | N. E. & E.                        | Cloudless.                                                                                                        |
| 29 <i>Sunday.</i> |                       |                                 |                                   |                                                                                                                   |
| 30                | 134.5                 | ...                             | N. & N. E.                        | Cloudless.                                                                                                        |
| 31                | 135.0                 | ...                             | N.                                | Cloudless till 6 A. M. Scatd \i & \i till 4 P. M. cloudless afterwards.                                           |

\i Cirri, \i Cirro strati, \i Cumuli, \i Cumulo strati, \i Nimbi, —i Strati, \i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of December, 1861.*

MONTHLY RESULTS.

|                                                               | Inches |
|---------------------------------------------------------------|--------|
| Mean height of the Barometer for the month, ..                | 30.008 |
| Max. height of the Barometer occurred at 10 A. M. on the 6th, | 30.164 |
| Min. height of the Barometer occurred at 4 P. M. on the 16th, | 29.850 |
| <i>Extreme range</i> of the Barometer during the month, ..    | 0.314  |
| Mean of the Daily Max. Pressures,                             | 30.077 |
| Ditto ditto Min. ditto, ..                                    | 29.955 |
| <i>Mean daily range</i> of the Barometer during the month,    | 0.122  |

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|                                                              | °    |
|--------------------------------------------------------------|------|
| Mean Dry Bulb Thermometer for the month,                     | 66.5 |
| Max. Temperature occurred at 2 P. M. on the 9th,             | 79.4 |
| Min. Temperature occurred at 6 A. M. on the 27th,            | 56.8 |
| <i>Extreme range</i> of the Temperature during the month,    | 22.6 |
| Mean of the daily Max. Temperature, ..                       | 74.5 |
| Ditto ditto Min. ditto, ..                                   | 60.2 |
| <i>Mean daily range</i> of the Temperature during the month, | 14.3 |
| Mean Wet Bulb Thermometer for the month, ..                  | 61.7 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,   | 4.8  |
| Computed Mean Dew-point for the month, .. ..                 | 58.8 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,     | 7.7  |

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|                                             | Inches |
|---------------------------------------------|--------|
| Mean Elastic force of Vapour for the month, | 0.503  |

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|                                                                         | Troy grains |
|-------------------------------------------------------------------------|-------------|
| Mean Weight of Vapour for the month,                                    | 5.56        |
| Additional Weight of Vapour required for complete saturation,           | 1.63        |
| Mean degree of humidity for the month, complete saturation being unity, | 0.77        |

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|                                                   | Inches  |
|---------------------------------------------------|---------|
| Rained 2 days, Max. fall of rain during 24 hours, | 0.26    |
| Total amount of rain during the month,            | 0.26    |
| Prevailing direction of the Wind, ..              | N. & W. |



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in the month of December, 1861.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 8            |          | 4     |          | 2  |          |       |          | 1  |          | 1     |          | 5  |          | 3     |          |       |          | 2       |
| 1         | 9            |          | 4     |          | 2  |          |       |          | 1  |          | 1     |          | 5  |          | 4     |          |       |          |         |
| 2         | 9            |          | 4     |          | 1  |          |       |          | 2  |          | 1     |          | 5  |          | 4     |          |       |          |         |
| 3         | 8            |          | 3     |          | 1  |          |       |          | 1  |          | 2     |          | 4  |          | 4     |          |       |          | 3       |
| 4         | 9            |          | 2     |          | 2  |          |       |          | 1  |          | 1     |          | 4  |          | 4     |          |       |          | 3       |
| 5         | 9            |          | 3     |          | 2  |          |       |          | 1  |          | 2     |          | 4  |          | 3     |          |       |          | 2       |
| 6         | 11           |          | 4     |          | 2  |          |       |          | 2  |          | 2     |          | 3  |          | 2     |          |       |          |         |
| 7         | 10           |          | 3     |          | 3  |          |       |          | 2  |          | 1     |          | 5  |          | 2     |          |       |          |         |
| 8         | 6            |          | 5     |          | 1  |          |       |          | 2  |          |       |          | 4  |          | 1     |          |       |          | 7       |
| 9         | 5            |          | 8     |          | 3  |          |       |          | 2  | 1        |       |          | 5  |          | 3     |          |       |          |         |
| 10        | 6            |          | 7     |          | 3  |          |       |          | 2  |          | 1     |          | 4  |          | 3     |          |       |          |         |
| 11        | 5            |          | 8     |          | 3  |          |       |          | 1  |          |       |          | 6  |          | 3     |          |       |          |         |
| Noon.     | 5            |          | 4     |          | 4  |          | 1     |          | 1  | 1        | 1     |          | 7  |          | 3     |          |       |          |         |
| 1         | 4            |          | 3     |          | 2  |          | 2     |          | 1  |          | 1     |          | 5  |          | 8     |          |       |          |         |
| 2         | 4            |          | 4     |          | 3  |          |       |          | 1  |          | 1     |          | 8  |          | 5     |          |       |          |         |
| 3         | 4            |          | 4     |          | 2  |          | 1     |          |    |          | 1     |          | 6  |          | 8     |          |       |          |         |
| 4         | 6            |          | 2     |          | 1  |          | 1     |          | 1  |          | 1     |          | 4  |          | 8     |          |       |          | 2       |
| 5         | 10           |          | 2     |          | 1  |          | 1     |          | 3  |          | 1     |          | 5  |          | 2     |          |       |          | 1       |
| 6         | 10           |          | 2     |          | 1  |          | 1     |          | 3  |          | 1     |          | 6  |          | 2     |          |       |          |         |
| 7         | 10           |          | 3     |          | 1  |          | 1     |          | 2  |          |       |          | 5  |          | 4     |          |       |          |         |
| 8         | 10           |          | 3     |          | 1  |          | 1     |          | 2  |          |       |          | 5  |          | 4     |          |       |          |         |
| 9         | 11           |          | 3     |          | 1  |          | 1     |          | 1  |          |       |          | 5  |          | 4     |          |       |          |         |
| 10        | 11           |          | 4     |          |    |          | 1     |          | 1  |          |       |          | 4  |          | 4     |          |       |          | 1       |
| 11        | 11           |          | 4     |          |    |          | 1     |          | 1  |          |       |          | 5  |          | 4     |          |       |          |         |





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1862.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 30.037                                          | 30.099                                    | 29.981  | 0.118   | 65.5                          | 74.8                                          | 59.0 | 15.8  |
| 2     | .044                                            | .108                                      | .985    | .123    | 65.7                          | 74.3                                          | 59.2 | 15.1  |
| 3     | .099                                            | .183                                      | 30.053  | .130    | 65.5                          | 74.6                                          | 58.4 | 16.2  |
| 4     | .086                                            | .152                                      | .040    | .112    | 65.5                          | 74.8                                          | 58.0 | 16.8  |
| 5     | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 6     | .003                                            | .080                                      | 29.953  | .127    | 66.3                          | 75.8                                          | 58.8 | 17.0  |
| 7     | 29.987                                          | .076                                      | .929    | .147    | 67.3                          | 77.8                                          | 58.4 | 19.4  |
| 8     | .933                                            | .035                                      | .870    | .165    | 69.7                          | 78.0                                          | 62.6 | 15.4  |
| 9     | .881                                            | 29.938                                    | .818    | .120    | 70.9                          | 75.4                                          | 67.2 | 8.2   |
| 10    | .931                                            | .996                                      | .882    | .114    | 69.7                          | 76.8                                          | 65.8 | 11.0  |
| 11    | 30.019                                          | 30.093                                    | .940    | .153    | 67.1                          | 75.4                                          | 61.6 | 13.8  |
| 12    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 13    | .006                                            | .074                                      | .956    | .118    | 67.9                          | 74.4                                          | 62.4 | 12.0  |
| 14    | .048                                            | .112                                      | 30.000  | .112    | 68.1                          | 75.4                                          | 60.8 | 14.6  |
| 15    | .059                                            | .140                                      | .009    | .131    | 69.1                          | 76.8                                          | 62.0 | 14.8  |
| 16    | .048                                            | .126                                      | 29.996  | .130    | 70.4                          | 78.3                                          | 65.8 | 12.5  |
| 17    | .046                                            | .110                                      | .994    | .116    | 67.4                          | 69.2                                          | 65.2 | 4.0   |
| 18    | .072                                            | .150                                      | 30.035  | .115    | 67.0                          | 74.2                                          | 62.8 | 11.4  |
| 19    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 20    | .084                                            | .167                                      | .028    | .139    | 62.7                          | 71.8                                          | 55.2 | 16.6  |
| 21    | .055                                            | .126                                      | 29.982  | .144    | 63.9                          | 73.8                                          | 55.7 | 18.1  |
| 22    | .074                                            | .145                                      | 30.034  | .111    | 67.1                          | 77.4                                          | 58.2 | 19.2  |
| 23    | .055                                            | .131                                      | .011    | .120    | 68.4                          | 77.2                                          | 60.6 | 16.6  |
| 24    | .026                                            | .112                                      | 29.972  | .140    | 68.6                          | 76.8                                          | 63.3 | 13.5  |
| 25    | 29.991                                          | .088                                      | .925    | .163    | 69.2                          | 76.7                                          | 62.2 | 14.5  |
| 26    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 27    | .828                                            | 29.894                                    | .768    | .126    | 69.8                          | 74.0                                          | 66.2 | 7.8   |
| 28    | .907                                            | .990                                      | .858    | .132    | 65.7                          | 72.0                                          | 59.5 | 12.5  |
| 29    | .975                                            | 30.046                                    | .928    | .118    | 62.6                          | 71.6                                          | 55.2 | 16.4  |
| 30    | .980                                            | .062                                      | .924    | .138    | 63.7                          | 73.2                                          | 55.4 | 17.8  |
| 31    | .955                                            | .025                                      | .908    | .117    | 65.2                          | 75.6                                          | 56.4 | 19.2  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1862.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 60.3                            | 5.2                 | 57.2                | 8.3                          | 0.476                            | 5.28                                             | 1.70                                                                    | 0.76                                                              |
| 2     | 59.6                            | 6.1                 | 55.9                | 9.8                          | .456                             | .06                                              | .96                                                                     | .72                                                               |
| 3     | 59.9                            | 5.6                 | 56.5                | 9.0                          | .465                             | .17                                              | .81                                                                     | .74                                                               |
| 4     | 60.3                            | 5.2                 | 57.2                | 8.3                          | .476                             | .28                                              | .70                                                                     | .76                                                               |
| 5     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 6     | 60.5                            | 5.8                 | 57.0                | 9.3                          | .473                             | .24                                              | .91                                                                     | .73                                                               |
| 7     | 62.6                            | 4.7                 | 59.8                | 7.5                          | .520                             | .74                                              | .63                                                                     | .78                                                               |
| 8     | 66.1                            | 3.6                 | 64.3                | 5.4                          | .603                             | 6.65                                             | .28                                                                     | .84                                                               |
| 9     | 67.1                            | 3.8                 | 65.2                | 5.7                          | .621                             | .83                                              | .40                                                                     | .83                                                               |
| 10    | 64.5                            | 5.2                 | 61.9                | 7.8                          | .557                             | .13                                              | .80                                                                     | .77                                                               |
| 11    | 61.9                            | 5.2                 | 58.8                | 8.3                          | .503                             | 5.56                                             | .76                                                                     | .76                                                               |
| 12    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 13    | 63.3                            | 4.6                 | 60.5                | 7.4                          | .532                             | .89                                              | .62                                                                     | .78                                                               |
| 14    | 63.2                            | 4.9                 | 60.3                | 7.8                          | .528                             | .84                                              | .71                                                                     | .77                                                               |
| 15    | 64.6                            | 4.5                 | 62.3                | 6.8                          | .565                             | 6.22                                             | .56                                                                     | .80                                                               |
| 16    | 66.0                            | 4.4                 | 63.8                | 6.6                          | .593                             | .52                                              | .58                                                                     | .81                                                               |
| 17    | 65.0                            | 2.4                 | 63.6                | 3.8                          | .590                             | .52                                              | 0.87                                                                    | .82                                                               |
| 18    | 63.1                            | 3.9                 | 60.8                | 6.2                          | .537                             | 5.95                                             | 1.35                                                                    | .82                                                               |
| 19    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 20    | 56.9                            | 5.8                 | 52.8                | 9.9                          | .411                             | 4.59                                             | .80                                                                     | .72                                                               |
| 21    | 57.8                            | 6.1                 | 53.5                | 10.4                         | .421                             | .69                                              | .94                                                                     | .71                                                               |
| 22    | 60.5                            | 6.6                 | 56.5                | 10.6                         | .465                             | 5.14                                             | 2.18                                                                    | .70                                                               |
| 23    | 62.9                            | 5.5                 | 59.6                | 8.8                          | .516                             | .70                                              | 1.92                                                                    | .75                                                               |
| 24    | 63.4                            | 5.2                 | 60.8                | 7.8                          | .537                             | .92                                              | .75                                                                     | .77                                                               |
| 25    | 63.8                            | 5.4                 | 61.1                | 8.1                          | .543                             | .98                                              | .83                                                                     | .77                                                               |
| 26    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 27    | 64.9                            | 4.9                 | 62.4                | 7.4                          | .567                             | 6.24                                             | .71                                                                     | .79                                                               |
| 28    | 57.9                            | 7.8                 | 53.2                | 12.5                         | .416                             | 4.62                                             | 2.40                                                                    | .66                                                               |
| 29    | 56.0                            | 6.6                 | 51.4                | 11.2                         | .392                             | .38                                              | 1.99                                                                    | .69                                                               |
| 30    | 56.8                            | 6.9                 | 52.0                | 11.7                         | .400                             | .45                                              | 2.14                                                                    | .68                                                               |
| 31    | 58.9                            | 6.3                 | 55.1                | 10.1                         | .444                             | .94                                              | 1.97                                                                    | .72                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.



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taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 30.010                                          | 30.104                                                       | 29.817  | 0.287   | 64.0                          | 71.6                                                                | 58.6 | 13.0  |
| 1              | .002                                            | .096                                                         | .799    | .297    | 63.3                          | 71.2                                                                | 57.9 | 13.3  |
| 2              | 29.999                                          | .085                                                         | .779    | .306    | 62.9                          | 71.6                                                                | 57.0 | 14.6  |
| 3              | .986                                            | .076                                                         | .768    | .308    | 62.5                          | 70.6                                                                | 56.5 | 14.1  |
| 4              | .995                                            | .068                                                         | .866    | .202    | 61.2                          | 67.0                                                                | 56.3 | 10.7  |
| 5              | .987                                            | .081                                                         | .799    | .282    | 61.5                          | 69.2                                                                | 55.7 | 13.5  |
| 6              | 30.003                                          | .098                                                         | .818    | .280    | 61.0                          | 69.0                                                                | 55.6 | 13.4  |
| 7              | .022                                            | .113                                                         | .833    | .280    | 60.8                          | 68.5                                                                | 55.2 | 13.3  |
| 8              | .056                                            | .164                                                         | .867    | .297    | 62.0                          | 67.0                                                                | 57.0 | 10.0  |
| 9              | .082                                            | .180                                                         | .885    | .295    | 65.8                          | 72.0                                                                | 61.2 | 10.8  |
| 10             | .081                                            | .183                                                         | .894    | .289    | 68.0                          | 72.6                                                                | 63.6 | 9.0   |
| 11             | .066                                            | .159                                                         | .880    | .279    | 70.5                          | 74.6                                                                | 66.4 | 8.2   |
|                |                                                 |                                                              |         |         |                               |                                                                     |      |       |
| Noon.          | .039                                            | .134                                                         | .867    | .267    | 72.3                          | 76.4                                                                | 67.0 | 9.4   |
| 1              | .006                                            | .091                                                         | .840    | .251    | 73.7                          | 78.0                                                                | 67.0 | 11.0  |
| 2              | 29.983                                          | .068                                                         | .814    | .254    | 74.5                          | 77.5                                                                | 68.4 | 9.1   |
| 3              | .968                                            | .058                                                         | .797    | .261    | 74.7                          | 78.3                                                                | 68.8 | 9.5   |
| 4              | .958                                            | .040                                                         | .783    | .257    | 73.5                          | 76.2                                                                | 69.2 | 7.0   |
| 5              | .965                                            | .053                                                         | .793    | .260    | 72.2                          | 75.0                                                                | 68.6 | 6.4   |
| 6              | .971                                            | .058                                                         | .787    | .271    | 69.9                          | 72.7                                                                | 66.2 | 6.5   |
| 7              | .989                                            | .073                                                         | .807    | .266    | 68.1                          | 71.4                                                                | 64.0 | 7.4   |
| 8              | 30.005                                          | .092                                                         | .846    | .246    | 66.9                          | 69.8                                                                | 62.4 | 7.4   |
| 9              | .016                                            | .106                                                         | .854    | .252    | 66.0                          | 69.4                                                                | 62.0 | 7.4   |
| 10             | .025                                            | .107                                                         | .860    | .247    | 65.1                          | 69.3                                                                | 61.5 | 7.8   |
| 11             | .025                                            | .105                                                         | .868    | .237    | 64.5                          | 69.0                                                                | 60.4 | 8.6   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 61.2                            | 2.8                 | 59.2                | 4.8                          | 0.509                            | 5.67                                                  | 0.98                                                                     | 0.85                                                                 |
| 1              | 60.7                            | 2.6                 | 58.9                | 4.4                          | .504                             | .62                                                   | .89                                                                      | .86                                                                  |
| 2              | 60.4                            | 2.5                 | 58.6                | 4.3                          | .499                             | .58                                                   | .85                                                                      | .87                                                                  |
| 3              | 60.1                            | 2.4                 | 58.4                | 4.1                          | .496                             | .54                                                   | .81                                                                      | .87                                                                  |
| 4              | 58.6                            | 2.6                 | 56.5                | 4.7                          | .465                             | .21                                                   | .89                                                                      | .85                                                                  |
| 5              | 59.1                            | 2.4                 | 57.4                | 4.1                          | .480                             | .37                                                   | .79                                                                      | .87                                                                  |
| 6              | 58.5                            | 2.5                 | 56.5                | 4.5                          | .465                             | .21                                                   | .85                                                                      | .86                                                                  |
| 7              | 58.3                            | 2.5                 | 56.3                | 4.5                          | .462                             | .18                                                   | .84                                                                      | .86                                                                  |
| 8              | 58.5                            | 3.5                 | 56.0                | 6.0                          | .458                             | .12                                                   | 1.13                                                                     | .82                                                                  |
| 9              | 60.8                            | 5.0                 | 57.8                | 8.0                          | .486                             | .39                                                   | .65                                                                      | .77                                                                  |
| 10             | 61.6                            | 6.4                 | 57.8                | 10.2                         | .486                             | .37                                                   | 2.16                                                                     | .71                                                                  |
| 11             | 62.5                            | 8.0                 | 58.5                | 12.0                         | .498                             | .47                                                   | .66                                                                      | .67                                                                  |
| Noon.          | 63.3                            | 9.0                 | 58.8                | 13.5                         | .503                             | .49                                                   | 3.09                                                                     | .64                                                                  |
| 1              | 63.8                            | 9.9                 | 58.8                | 14.9                         | .503                             | .48                                                   | .48                                                                      | .61                                                                  |
| 2              | 64.1                            | 10.4                | 58.9                | 15.6                         | .504                             | .49                                                   | .69                                                                      | .60                                                                  |
| 3              | 64.3                            | 10.4                | 59.1                | 15.6                         | .508                             | .53                                                   | .70                                                                      | .60                                                                  |
| 4              | 64.2                            | 9.3                 | 59.5                | 14.0                         | .515                             | .62                                                   | .28                                                                      | .63                                                                  |
| 5              | 64.0                            | 8.2                 | 59.9                | 12.3                         | .521                             | .71                                                   | 2.84                                                                     | .67                                                                  |
| 6              | 64.1                            | 5.8                 | 61.2                | 8.7                          | .544                             | .99                                                   | 1.99                                                                     | .75                                                                  |
| 7              | 63.5                            | 4.6                 | 60.7                | 7.4                          | .536                             | .92                                                   | .63                                                                      | .78                                                                  |
| 8              | 63.0                            | 3.9                 | 60.7                | 6.2                          | .536                             | .93                                                   | .35                                                                      | .82                                                                  |
| 9              | 62.4                            | 3.6                 | 60.2                | 5.8                          | .527                             | .84                                                   | .24                                                                      | .83                                                                  |
| 10             | 61.8                            | 3.3                 | 59.8                | 5.3                          | .520                             | .77                                                   | .12                                                                      | .84                                                                  |
| 11             | 61.5                            | 3.0                 | 59.7                | 4.8                          | .518                             | .76                                                   | .00                                                                      | .85                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                     |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------|
|       | °                     | Inches.                         |                                   |                                                                                                |
| 1     | 123.0                 | ...                             | N.                                | Cloudless.                                                                                     |
| 2     | 132.4                 | ...                             | N. & N. W.                        | Cloudless.                                                                                     |
| 3     | 135.4                 | ...                             | N.                                | Cloudless.                                                                                     |
| 4     | 134.0                 | ...                             | N. & E.                           | Cloudless ; also foggy after 8 P. M.                                                           |
| 5     | <i>Sunday.</i>        |                                 |                                   |                                                                                                |
| 6     | 134.0                 | ...                             | N.                                | Cloudless ; also foggy after 7 P. M.                                                           |
| 7     | 134.0                 | ...                             | S. & N.                           | Cloudless ; also slightly foggy at 6 A. M.                                                     |
| 8     | 116.0                 | ...                             | S. & E.                           | Cloudless till 6 A. M. Scatd. ∩i till 2 P. M. cloudy afterwards.                               |
| 9     | 114.0                 | ...                             | S. & W.                           | Cloudy till 4 P. M. Scatd. ∩i afterwards.                                                      |
| 10    | 135.0                 | ...                             | E. & S. W.                        | Cloudy till 7 A. M. Scatd. ∩i till 2 P. M. cloudless afterwards.                               |
| 11    | 130.5                 | ...                             | N. & N. E. & E.                   | Cloudless till 7 A. M. Scatd. clouds till 11 A. M. cloudless afterwards.                       |
| 12    | <i>Sunday.</i>        |                                 |                                   |                                                                                                |
| 13    | 136.0                 | ...                             | W. & E.                           | Scatd. clouds till 3 P. M., cloudless afterwards ; also drizzled at Midnight.                  |
| 14    | 134.0                 | ...                             | E. & N. E.                        | Cloudless till 1 P. M. Scatd. ∩i afterwards.                                                   |
| 15    | 132.0                 | ...                             | E. & S. W. & S. E.                | Cloudless till 11 A. M. cloudy afterwards ; also drizzling at 5 & 7 P. M.                      |
| 16    | 137.4                 | 0.36                            | N. E. & N. W.                     | Cloudy, also raining from 5 to 7 P. M.                                                         |
| 17    | ...                   | 0.20                            | S. & E.                           | Cloudy till 7 P. M. cloudless afterwards ; also drizzling at Midnight & from 8 A. M. to Noon.  |
| 18    | 130.0                 | ...                             | N. & N. W.                        | Cloudless till 3 A. M. cloudy till 8 A. M. cloudless afterwards ; also drizzling at 4 A. M.    |
| 19    | <i>Sunday.</i>        |                                 |                                   |                                                                                                |
| 20    | 126.0                 | ...                             | S. W. & N.                        | Cloudless.                                                                                     |
| 21    | 137.0                 | ...                             | N.                                | Cloudless.                                                                                     |
| 22    | 132.2                 | ...                             | N. & W.                           | Cloudless.                                                                                     |
| 23    | 134.0                 | ...                             | N. & E.                           | Cloudless ; also foggy from 9 to 11 P. M.                                                      |
| 24    | 136.4                 | ...                             | N. & E. & N. W.                   | Cloudless.                                                                                     |
| 25    | 131.2                 | ...                             | N.                                | Cloudless.                                                                                     |
| 26    | <i>Sunday.</i>        | 0.47                            |                                   |                                                                                                |
| 27    | ...                   | ...                             | N. & N. W.                        | Cloudy till Noon. Scatd. ∩i & ∩i till 6 P. M. cloudless afterwards ; also drizzling at 5 A. M. |
| 28    | 125.0                 | ...                             | N & N. W.                         | Cloudless till 11 A. M. Scatd. ∩i till 6 P. M. cloudless afterwards.                           |
| 29    | 127.0                 | ...                             | N.                                | Cloudless.                                                                                     |
| 30    | 132.0                 | ...                             | N. W. & N.                        | Cloudless ; also foggy from 8 to 11 P. M.                                                      |
| 31    | 129.0                 | ...                             | N. & variable.                    | Cloudless.                                                                                     |

∩i Cirri, ∩i Cirro strati, ∩i Cumuli, ∩i Cumulo strati, ∩i Nimbi, —i Strati, ∩i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1862.*

## MONTHLY RESULTS.

|                                                               |    |    | Inches. |
|---------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer for the month,                   | .. | .. | 30.009  |
| Max. height of the Barometer occurred at 10 A. M. on the 3rd, | .. | .. | 30.183  |
| Min. height of the Barometer occurred at 3 A. M. on the 27th, | .. | .. | 29.768  |
| <i>Extreme range</i> of the Barometer during the month,       | .. | .. | 0.415   |
| Mean of the daily Max. Pressures,                             | .. | .. | 30.084  |
| Ditto ditto Min. ditto,                                       | .. | .. | 29.955  |
| <i>Mean daily range</i> of the Barometer during the month,    | .. | .. | 0.129   |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 67.0 |
| Max. Temperature occurred at 3 P. M. on the 16th,            | .. | .. | 78.3 |
| Min. Temperature occurred at 7 A. M. on the 20th & 29th,     | .. | .. | 55.2 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 23 1 |
| Mean of the daily Max. Temperature,                          | .. | .. | 75.0 |
| Ditto ditto Min. ditto,                                      | .. | .. | 60.6 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 14.4 |

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|                                                            |    |    | °      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 61.8   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 5.2    |
| Computed Mean Dew-point for the month,                     | .. | .. | 58.7   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 8.3    |
|                                                            |    |    | Inches |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.501  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 5.55        |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 1.75        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.76        |

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|                                                   |    |    | Inches |
|---------------------------------------------------|----|----|--------|
| Rained 7 days, Max. fall of rain during 24 hours, | .. | .. | 0.47   |
| Total amount of rain during the month,            | .. | .. | 1.03   |
| Prevailing direction of the Wind,                 | .. | .. | N.     |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of January, 1862.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 15           | 1        | 1     |          | 6  | 1        |       |          | 1  |          | 1     |          | 1  |          | 1     |          |       |          | 1       |
| 1         | 16           |          | 1     |          | 6  |          |       |          | 1  |          | 1     |          | 1  |          | 1     |          |       |          | 1       |
| 2         | 14           |          | 1     |          | 7  |          |       |          | 1  |          | 1     |          | 1  |          | 1     |          |       |          | 1       |
| 3         | 14           |          | 1     |          | 6  |          |       |          | 1  |          | 1     |          | 1  |          | 2     |          |       |          | 1       |
| 4         | 15           | 1        | 1     |          | 5  |          |       |          |    |          | 1     |          | 1  |          | 1     |          |       |          | 3       |
| 5         | 13           |          | 1     |          | 4  |          |       |          | 1  |          | 1     |          | 1  |          | 4     | 1        |       |          | 2       |
| 6         | 14           |          | 2     |          | 3  |          |       |          | 1  |          | 2     |          | 1  |          | 4     |          |       |          |         |
| 7         | 13           |          | 1     |          | 3  |          | 1     |          | 1  |          | 3     |          | 1  |          | 4     |          |       |          |         |
| 8         | 11           |          | 1     |          | 1  |          |       |          |    |          | 1     | 1        | 1  |          | 2     |          |       |          | 10      |
| 9         | 12           |          | 3     |          | 4  | 1        |       |          | 2  |          | 1     |          | 2  |          | 2     |          |       |          | 1       |
| 10        | 13           |          | 2     |          | 3  | 1        | 2     |          | 3  |          | 1     |          | 1  |          | 2     |          |       |          |         |
| 11        | 11           |          | 2     |          | 2  | 1        | 2     |          | 2  |          | 1     |          | 3  |          | 4     |          |       |          |         |
| Noon.     | 10           | 1        | 3     |          | 1  |          | 1     |          | 2  |          | 1     |          | 3  |          | 6     |          |       |          |         |
| 1         | 10           |          | 1     |          | 2  |          | 4     |          | 1  |          | 1     |          | 2  |          | 6     |          |       |          |         |
| 2         | 9            |          | 1     |          | 2  |          | 2     |          | 2  |          | 1     |          | 4  |          | 6     |          |       |          |         |
| 3         | 7            |          | 1     |          | 2  |          | 2     |          | 2  |          |       |          | 7  |          | 6     |          |       |          |         |
| 4         | 8            |          |       |          | 2  |          | 1     |          | 2  |          | 5     |          | 1  |          | 6     |          |       |          | 2       |
| 5         | 11           |          | 1     |          | 2  |          | 1     |          | 3  |          | 3     | 1        | 1  |          | 5     | 1        |       |          |         |
| 6         | 10           |          |       |          | 5  |          |       |          | 3  |          | 4     |          | 1  |          | 4     | 1        |       |          |         |
| 7         | 12           |          |       |          | 5  |          |       |          | 3  |          | 4     | 1        | 1  |          | 2     | 1        |       |          |         |
| 8         | 12           |          | 1     |          | 5  |          |       |          | 3  |          | 3     |          | 1  |          | 2     |          |       |          |         |
| 9         | 12           |          | 1     |          | 5  |          |       |          | 3  |          | 3     |          | 1  |          | 2     |          |       |          |         |
| 10        | 12           |          | 2     |          | 4  |          |       |          | 3  |          | 1     |          | 1  |          | 3     |          |       |          | 1       |
| 11        | 11           |          | 2     |          | 6  |          |       |          | 2  |          | 1     |          | 1  |          | 2     |          |       |          | 2       |





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1862.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.923                                          | 30.000                                    | 29.875  | 0.125   | 69.6                          | 79.4                                          | 60.0 | 19.4  |
| 2     | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 3     | .903                                            | 29.990                                    | .848    | .142    | 68.4                          | 77.2                                          | 60.0 | 17.2  |
| 4     | .899                                            | .957                                      | .852    | .105    | 69.5                          | 78.2                                          | 62.8 | 15.4  |
| 5     | .960                                            | 30.046                                    | .914    | .132    | 67.9                          | 78.0                                          | 59.0 | 19.0  |
| 6     | .998                                            | .072                                      | .947    | .125    | 66.6                          | 76.6                                          | 58.4 | 18.2  |
| 7     | 30.009                                          | .090                                      | .935    | .155    | 65.5                          | 76.2                                          | 56.4 | 19.8  |
| 8     | .004                                            | .081                                      | .952    | .129    | 66.7                          | 77.0                                          | 56.6 | 20.4  |
| 9     | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 10    | .040                                            | .114                                      | .974    | .140    | 72.6                          | 83.4                                          | 63.7 | 19.7  |
| 11    | .061                                            | .130                                      | 30.018  | .112    | 72.7                          | 82.6                                          | 63.8 | 18.8  |
| 12    | .088                                            | .177                                      | .028    | .149    | 72.5                          | 83.4                                          | 63.4 | 20.0  |
| 13    | .043                                            | .132                                      | 29.979  | .153    | 73.0                          | 83.8                                          | 63.6 | 20.2  |
| 14    | .015                                            | .104                                      | .946    | .158    | 74.6                          | 85.2                                          | 64.2 | 21.0  |
| 15    | 29.967                                          | .031                                      | .919    | .112    | 75.5                          | 83.4                                          | 70.0 | 13.4  |
| 16    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 17    | .923                                            | 29.992                                    | .874    | .118    | 76.7                          | 85.4                                          | 69.2 | 16.2  |
| 18    | .930                                            | 30.002                                    | .880    | .122    | 75.6                          | 83.8                                          | 67.6 | 16.2  |
| 19    | .939                                            | .002                                      | .875    | .127    | 75.7                          | 84.6                                          | 68.0 | 16.6  |
| 20    | .918                                            | 29.998                                    | .834    | .164    | 74.3                          | 83.8                                          | 66.0 | 17.8  |
| 21    | .850                                            | .919                                      | .782    | .137    | 75.4                          | 84.2                                          | 69.0 | 15.2  |
| 22    | .856                                            | .943                                      | .799    | .144    | 76.6                          | 85.5                                          | 70.3 | 15.2  |
| 23    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 24    | .865                                            | .932                                      | .815    | .117    | 77.4                          | 85.6                                          | 70.6 | 15.0  |
| 25    | .844                                            | .917                                      | .774    | .143    | 78.3                          | 87.4                                          | 72.8 | 14.6  |
| 26    | .749                                            | .822                                      | .665    | .157    | 78.0                          | 88.8                                          | 70.4 | 18.4  |
| 27    | .679                                            | .755                                      | .620    | .135    | 79.9                          | 91.0                                          | 72.4 | 18.6  |
| 28    | .741                                            | .811                                      | .647    | .164    | 79.9                          | 89.6                                          | 73.6 | 16.0  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1862.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 63.9                            | 5.7                 | 61.0                | 8.6                          | 0.541                            | 5.95                                             | 1.95                                                                    | 0.75                                                                |
| 2     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 3     | 61.1                            | 7.3                 | 56.7                | 11.7                         | .467                             | .16                                              | 2.46                                                                    | .68                                                                 |
| 4     | 64.2                            | 5.3                 | 61.5                | 8.0                          | .550                             | 6.06                                             | 1.82                                                                    | .77                                                                 |
| 5     | 59.7                            | 8.2                 | 54.8                | 13.1                         | .440                             | 4.85                                             | 2.66                                                                    | .65                                                                 |
| 6     | 57.7                            | 8.9                 | 52.4                | 14.2                         | .405                             | .49                                              | .72                                                                     | .62                                                                 |
| 7     | 57.2                            | 8.3                 | 52.2                | 13.3                         | .402                             | .47                                              | .51                                                                     | .64                                                                 |
| 8     | 59.2                            | 7.5                 | 54.7                | 12.0                         | .438                             | .85                                              | .38                                                                     | .67                                                                 |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 10    | 64.7                            | 7.9                 | 60.7                | 11.9                         | .536                             | 5.86                                             | 2.80                                                                    | .68                                                                 |
| 11    | 65.7                            | 7.0                 | 62.2                | 10.5                         | .563                             | 6.15                                             | .53                                                                     | .71                                                                 |
| 12    | 65.7                            | 6.8                 | 62.3                | 10.2                         | .565                             | .18                                              | .45                                                                     | .72                                                                 |
| 13    | 66.3                            | 6.7                 | 62.9                | 10.1                         | .576                             | .30                                              | .46                                                                     | .72                                                                 |
| 14    | 67.0                            | 7.6                 | 63.2                | 11.4                         | .582                             | .35                                              | .85                                                                     | .69                                                                 |
| 15    | 68.4                            | 7.1                 | 64.8                | 10.7                         | .613                             | .68                                              | .78                                                                     | .71                                                                 |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 17    | 68.1                            | 8.6                 | 63.8                | 12.9                         | .593                             | .44                                              | 3.36                                                                    | .66                                                                 |
| 18    | 66.5                            | 9.1                 | 61.9                | 13.7                         | .557                             | .06                                              | .42                                                                     | .64                                                                 |
| 19    | 67.9                            | 7.8                 | 64.0                | 11.7                         | .597                             | .49                                              | .02                                                                     | .68                                                                 |
| 20    | 66.3                            | 8.0                 | 62.3                | 12.0                         | .565                             | .16                                              | 2.96                                                                    | .68                                                                 |
| 21    | 69.7                            | 5.7                 | 66.8                | 8.6                          | .655                             | 7.13                                             | .30                                                                     | .76                                                                 |
| 22    | 71.2                            | 5.4                 | 68.5                | 8.1                          | .692                             | .53                                              | .24                                                                     | .77                                                                 |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 24    | 71.4                            | 6.0                 | 68.4                | 9.0                          | .690                             | .48                                              | .53                                                                     | .75                                                                 |
| 25    | 71.6                            | 6.7                 | 68.2                | 10.1                         | .686                             | .43                                              | .85                                                                     | .72                                                                 |
| 26    | 71.4                            | 6.6                 | 68.1                | 9.9                          | .684                             | .40                                              | .79                                                                     | .73                                                                 |
| 27    | 73.3                            | 6.6                 | 70.0                | 9.9                          | .727                             | .84                                              | .94                                                                     | .73                                                                 |
| 28    | 73.7                            | 6.2                 | 70.6                | 9.3                          | .741                             | 8.00                                             | .78                                                                     | .74                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fah.. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                              | o    | o     |
| Mid-<br>night. | 29.927                                          | 30.096                                                       | 29.664  | 0.432   | 68.9                          | 76.6                                                           | 60.4 | 16.2  |
| 1              | .923                                            | .087                                                         | .662    | .425    | 68.2                          | 75.8                                                           | 59.0 | 16.8  |
| 2              | .913                                            | .077                                                         | .655    | .422    | 67.8                          | 75.0                                                           | 58.4 | 16.6  |
| 3              | .907                                            | .074                                                         | .649    | .425    | 67.4                          | 74.6                                                           | 57.9 | 16.7  |
| 4              | .905                                            | .072                                                         | .647    | .425    | 66.8                          | 74.0                                                           | 57.2 | 16.8  |
| 5              | .916                                            | .084                                                         | .672    | .412    | 66.4                          | 73.6                                                           | 57.4 | 16.2  |
| 6              | .931                                            | .099                                                         | .683    | .416    | 65.8                          | 73.6                                                           | 56.4 | 17.2  |
| 7              | .949                                            | .119                                                         | .706    | .413    | 65.8                          | 74.0                                                           | 56.4 | 17.6  |
| 8              | .972                                            | .139                                                         | .722    | .417    | 68.9                          | 75.8                                                           | 58.6 | 17.2  |
| 9              | .997                                            | .172                                                         | .754    | .418    | 72.0                          | 78.6                                                           | 64.6 | 14.0  |
| 10             | .999                                            | .177                                                         | .755    | .422    | 75.0                          | 81.6                                                           | 68.4 | 13.2  |
| 11             | .985                                            | .167                                                         | .738    | .429    | 77.9                          | 85.6                                                           | 70.0 | 15.6  |
| Noon.          | .957                                            | .132                                                         | .722    | .410    | 79.9                          | 87.6                                                           | 72.8 | 14.8  |
| 1              | .925                                            | .096                                                         | .687    | .409    | 81.4                          | 89.0                                                           | 74.6 | 14.4  |
| 2              | .900                                            | .067                                                         | .660    | .407    | 82.4                          | 90.6                                                           | 75.6 | 15.0  |
| 3              | .881                                            | .049                                                         | .648    | .401    | 83.0                          | 91.0                                                           | 76.2 | 14.8  |
| 4              | .871                                            | .035                                                         | .620    | .415    | 82.0                          | 89.7                                                           | 75.4 | 14.3  |
| 5              | .875                                            | .028                                                         | .623    | .405    | 80.6                          | 87.0                                                           | 74.3 | 12.7  |
| 6              | .875                                            | .029                                                         | .633    | .396    | 77.3                          | 84.0                                                           | 70.0 | 14.0  |
| 7              | .893                                            | .048                                                         | .642    | .406    | 75.0                          | 82.0                                                           | 67.2 | 14.8  |
| 8              | .914                                            | .062                                                         | .663    | .399    | 73.8                          | 80.2                                                           | 65.6 | 14.6  |
| 9              | .925                                            | .075                                                         | .683    | .392    | 72.5                          | 79.0                                                           | 64.4 | 14.6  |
| 10             | .928                                            | .090                                                         | .685    | .405    | 71.4                          | 77.8                                                           | 63.0 | 14.8  |
| 11             | .926                                            | .096                                                         | .690    | .406    | 70.5                          | 77.6                                                           | 62.2 | 15.4  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 65.3                          | 3.6                 | 63.5                | 5.4                          | 0.588                            | 6.48                                                  | 1.26                                                                | 0.84                                                                |
| 1              | 64.7                          | 3.5                 | 62.6                | 5.6                          | .570                             | .29                                                   | .29                                                                 | .83                                                                 |
| 2              | 64.6                          | 3.2                 | 62.7                | 5.1                          | .572                             | .33                                                   | .15                                                                 | .85                                                                 |
| 3              | 64.2                          | 3.2                 | 62.3                | 5.1                          | .565                             | .25                                                   | .14                                                                 | .85                                                                 |
| 4              | 63.8                          | 3.0                 | 62.0                | 4.8                          | .559                             | .19                                                   | .07                                                                 | .85                                                                 |
| 5              | 63.4                          | 3.0                 | 61.6                | 4.8                          | .552                             | .11                                                   | .06                                                                 | .85                                                                 |
| 6              | 63.1                          | 2.7                 | 61.5                | 4.3                          | .550                             | .11                                                   | 0.93                                                                | .87                                                                 |
| 7              | 63.0                          | 2.8                 | 61.3                | 4.5                          | .546                             | .06                                                   | .98                                                                 | .86                                                                 |
| 8              | 64.4                          | 4.5                 | 62.1                | 6.8                          | .561                             | .18                                                   | 1.56                                                                | .80                                                                 |
| 9              | 65.8                          | 6.2                 | 62.7                | 9.3                          | .572                             | .27                                                   | 2.23                                                                | .74                                                                 |
| 10             | 66.9                          | 8.1                 | 62.8                | 12.2                         | .574                             | .26                                                   | 3.05                                                                | .67                                                                 |
| 11             | 67.7                          | 10.2                | 62.6                | 15.3                         | .570                             | .18                                                   | .98                                                                 | .61                                                                 |
|                |                               |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| Noon.          | 67.6                          | 12.3                | 61.4                | 18.5                         | .548                             | 5.91                                                  | 4.87                                                                | .55                                                                 |
| 1              | 68.0                          | 13.4                | 61.3                | 20.1                         | .546                             | .88                                                   | 5.39                                                                | .52                                                                 |
| 2              | 67.9                          | 14.5                | 60.6                | 21.8                         | .534                             | .72                                                   | .89                                                                 | .49                                                                 |
| 3              | 68.1                          | 14.9                | 60.6                | 22.4                         | .534                             | .72                                                   | 6.10                                                                | .48                                                                 |
| 4              | 68.2                          | 13.8                | 61.3                | 20.7                         | .546                             | .86                                                   | 5.61                                                                | .51                                                                 |
| 5              | 68.5                          | 12.1                | 62.4                | 18.2                         | .567                             | 6.10                                                  | 4.91                                                                | .55                                                                 |
| 6              | 68.9                          | 8.4                 | 64.7                | 12.6                         | .611                             | .62                                                   | 3.36                                                                | .66                                                                 |
| 7              | 68.2                          | 6.8                 | 64.8                | 10.2                         | .613                             | .69                                                   | 2.62                                                                | .72                                                                 |
| 8              | 68.1                          | 5.7                 | 65.2                | 8.6                          | .621                             | .79                                                   | .19                                                                 | .76                                                                 |
| 9              | 67.6                          | 4.9                 | 65.1                | 7.4                          | .619                             | .79                                                   | 1.84                                                                | .79                                                                 |
| 10             | 67.1                          | 4.3                 | 64.9                | 6.5                          | .615                             | .75                                                   | .60                                                                 | .81                                                                 |
| 11             | 66.5                          | 4.0                 | 64.5                | 6.0                          | .607                             | .68                                                   | .45                                                                 | .82                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                 |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                            |
| 1     | 138.4                 | ...                             | N. & N. E. & W.                   | Cloudless.                                                                 |
| 2     | <i>Sunday.</i>        |                                 |                                   |                                                                            |
| 3     | 136.0                 | ...                             | N. & N. W.                        | Cloudless.                                                                 |
| 4     | 134.0                 | ...                             | W. & N. W.                        | Cloudless till 4 A. M. Scatd. clouds till 3 P. M. cloudless afterwards.    |
| 5     | 137.0                 | ...                             | N. & W.                           | Cloudless; also foggy after 9 P. M.                                        |
| 6     | 136.0                 | ...                             | W. & N. W. & N.                   | Cloudless; also foggy between 9 & 11 P. M.                                 |
| 7     | 128.0                 | ...                             | W. & N. W.                        | Cloudless.                                                                 |
| 8     | 127.0                 | ...                             | W. & N. W.                        | Cloudless.                                                                 |
| 9     | <i>Sunday.</i>        |                                 |                                   |                                                                            |
| 10    | 140.0                 | ...                             | E. & N.                           | Cloudless till 11 A. M. Scatd. i till 9 P. M. cloudless afterwards.        |
| 11    | 134.0                 | ...                             | S. & S. W.                        | Cloudless.                                                                 |
| 12    | 132.0                 | ...                             | N. & W. & S.                      | Cloudless.                                                                 |
| 13    | 137.8                 | ..                              | E. & N. W. & S.                   | Cloudless; also foggy between 8 & 10 P. M.                                 |
| 14    | 135.0                 | ...                             | N. & S.                           | Cloudless till 4 A. M. Scatd. \i afterwards.                               |
| 15    | ...                   | ...                             | S. & W.                           | Scatd. \i till 4 A. M. cloudy afterwards.                                  |
| 16    | <i>Sunday.</i>        |                                 |                                   |                                                                            |
| 17    | 134.0                 | ...                             | W. & N. W.                        | Scatd. \i till 3 P. M. cloudless afterwards.                               |
| 18    | 134.0                 | ...                             | N. & N. E.                        | Scatd. \i & \i till 6 A. M. cloudless afterwards.                          |
| 19    | 135.4                 | ...                             | S. W. & S. E.                     | Cloudless till 11 A. M. Scatd. \i till 6 P. M. cloudless afterwards.       |
| 20    | 137.0                 | ...                             | W. & N. & S.                      | Cloudless.                                                                 |
| 21    | 134.7                 | ...                             | S.                                | Cloudy and foggy till 9 A. M. Scatd. \i till 5 P. M. cloudless afterwards. |
| 22    | 134.5                 | ...                             | S.                                | Scatd. clouds till 4 P. M. cloudless afterwards.                           |
| 23    | <i>Sunday.</i>        |                                 |                                   |                                                                            |
| 24    | 135.4                 | ...                             | S. W. & S. & W.                   | Cloudless.                                                                 |
| 25    | 138.0                 | ...                             | S.                                | Cloudless.                                                                 |
| 26    | 138.0                 | ...                             | S.                                | Cloudless till 11 A. M. Scatd. \i till 3 P. M. cloudless afterwards.       |
| 27    | 141.6                 | ...                             | S.                                | Cloudless.                                                                 |
| 28    | 140.0                 | ...                             | S.                                | Cloudless.                                                                 |

\i Cirri, \i Cirro strati, \i Cumuli, \i Cumulo strati, \i Nimbi, —i Strati, \i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1862.*

## MONTHLY RESULTS.

|                                                                | Inches |
|----------------------------------------------------------------|--------|
| Mean height of the Barometer for the month, ..                 | 29.925 |
| Max. height of the Barometer occurred at 10 A. M. on the 12th, | 30.177 |
| Min. height of the Barometer occurred at 4 P. M. on the 27th,  | 29.620 |
| <i>Extreme range</i> of the Barometer during the month, ..     | 0.557  |
| Mean of the Daily Max. Pressures,                              | 30.001 |
| Ditto ditto Min. ditto, ..                                     | 29.865 |
| <i>Mean daily range</i> of the Barometer during the month,     | 0.136  |

|                                                              | o    |
|--------------------------------------------------------------|------|
| Mean Dry Bulb Thermometer for the month,                     | 73.4 |
| Max. Temperature occurred at 3 P. M. on the 27th,            | 91.0 |
| Min. Temperature occurred at 6 & 7 A. M. on the 7th,         | 56.4 |
| <i>Extreme range</i> of the Temperature during the month,    | 34.6 |
| Mean of the daily Max. Temperature, ..                       | 83.1 |
| Ditto ditto Min. ditto, ..                                   | 65.5 |
| <i>Mean daily range</i> of the Temperature during the month, | 17.6 |
| Mean Wet Bulb Thermometer for the month, ..                  | 66.3 |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,   | 7.1  |
| Computed Mean Dew-point for the month, ..                    | 62.7 |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,     | 10.7 |

|                                             | Inches |
|---------------------------------------------|--------|
| Mean Elastic force of Vapour for the month, | 0.572  |

|                                                                         | Troy grains |
|-------------------------------------------------------------------------|-------------|
| Mean Weight of Vapour for the month,                                    | 6.25        |
| Additional Weight of Vapour required for complete saturation,           | 2.62        |
| Mean degree of humidity for the month, complete saturation being unity, | 0.71        |

|                                                    | Inches  |
|----------------------------------------------------|---------|
| Rained no days, Max. fall of rain during 24 hours, | Nil.    |
| Total amount of rain during the month,             | Nil.    |
| Prevailing direction of the Wind, ..               | S. & W. |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of February, 1862.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 6            |          | 1     |          |    |          | 1     |          | 7  |          |       |          | 2  |          | 3     |          |       |          | 4       |
| 1         | 6            |          | 1     |          |    |          | 1     |          | 7  |          |       |          | 5  |          | 3     |          |       |          | 1       |
| 2         | 5            |          | 1     |          |    |          | 1     |          | 9  |          |       |          | 5  |          | 3     |          |       |          |         |
| 3         | 5            |          | 1     |          |    |          | 1     |          | 9  |          |       |          | 5  |          | 3     |          |       |          |         |
| 4         | 4            |          | 1     |          |    |          | 1     |          | 9  |          |       |          | 5  |          | 3     |          |       |          | 1       |
| 5         | 5            |          | 1     |          |    |          |       |          | 8  |          |       |          | 4  |          | 2     |          |       |          | 4       |
| 6         | 6            |          |       |          |    |          | 1     |          | 11 |          | 1     |          | 3  |          | 2     |          |       |          |         |
| 7         | 4            |          | 2     |          |    |          | 2     |          | 10 |          | 1     |          | 3  |          | 2     |          |       |          |         |
| 8         | 2            |          |       |          | 2  |          | 1     |          | 6  |          | 1     |          | 3  |          | 3     |          |       |          | 6       |
| 9         | 2            |          | 4     |          | 3  |          | 2     |          | 8  |          | 1     |          | 3  |          | 1     |          |       |          |         |
| 10        | 3            |          | 3     |          | 3  |          | 1     |          | 7  |          | 3     |          | 2  |          | 2     |          |       |          |         |
| 11        | 3            |          | 2     |          | 1  |          | 1     |          | 6  |          | 4     |          | 5  |          | 2     |          |       |          |         |
| Noon.     | 4            |          | 1     |          | 3  |          |       |          | 3  |          | 4     |          | 6  |          | 3     |          |       |          |         |
| 1         | 2            |          |       |          | 2  |          | 1     |          | 2  |          | 5     |          | 6  |          | 6     |          |       |          |         |
| 2         | 2            |          | 1     |          | 3  |          |       |          | 2  |          | 2     |          | 9  |          | 5     |          |       |          |         |
| 3         | 2            |          | 1     |          | 3  |          |       |          | 2  |          | 4     |          | 8  |          | 4     |          |       |          |         |
| 4         | 3            |          |       |          | 1  |          | 1     |          | 5  |          | 3     |          | 6  |          | 2     |          |       |          | 3       |
| 5         | 3            |          | 1     |          | 1  |          | 1     |          | 5  |          | 1     |          | 8  |          | 3     |          |       |          | 1       |
| 6         | 3            |          | 1     |          | 1  |          |       |          | 7  |          | 2     |          | 5  |          | 3     |          |       |          | 2       |
| 7         | 3            |          | 1     |          | 1  |          |       |          | 7  |          | 3     |          | 6  |          | 2     |          |       |          | 1       |
| 8         | 3            |          | 1     |          | 1  |          |       |          | 8  |          | 3     |          | 5  |          | 2     |          |       |          | 1       |
| 9         | 3            |          | 1     |          | 2  |          |       |          | 8  |          | 3     |          | 4  |          | 3     |          |       |          |         |
| 10        | 3            |          | 1     |          | 2  |          |       |          | 8  |          | 3     |          | 4  |          | 3     |          |       |          |         |
| 11        | 3            |          | 1     |          | 2  |          |       |          | 9  |          | 2     |          | 3  |          | 3     |          |       |          | 1       |





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1862.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | °                             | °                                             | °    | °     |
| 1     | 29.732                                          | 29.820                                    | 29.660  | 0.160   | 81.7                          | 91.2                                          | 76.0 | 15.2  |
| 2     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 3     | .920                                            | .999                                      | .845    | .154    | 73.7                          | 83.2                                          | 66.2 | 17.0  |
| 4     | .957                                            | 30.035                                    | .907    | .128    | 73.7                          | 84.0                                          | 64.5 | 19.5  |
| 5     | .946                                            | .027                                      | .869    | .158    | 75.3                          | 85.8                                          | 67.0 | 18.8  |
| 6     | .899                                            | 29.977                                    | .838    | .139    | 77.6                          | 86.0                                          | 71.2 | 14.8  |
| 7     | .962                                            | 30.047                                    | .891    | .156    | 79.0                          | 87.4                                          | 72.3 | 15.1  |
| 8     | .984                                            | .056                                      | .909    | .147    | 80.0                          | 88.2                                          | 72.8 | 15.4  |
| 9     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 10    | .862                                            | 29.949                                    | .789    | .160    | 78.4                          | 87.6                                          | 71.8 | 15.8  |
| 11    | .864                                            | .944                                      | .787    | .157    | 76.6                          | 83.2                                          | 71.6 | 11.6  |
| 12    | .958                                            | 30.045                                    | .900    | .145    | 76.2                          | 83.8                                          | 69.2 | 14.6  |
| 13    | .969                                            | .055                                      | .907    | .148    | 75.9                          | 84.7                                          | 67.0 | 17.7  |
| 14    | 30.006                                          | .115                                      | .940    | .175    | 76.1                          | 86.6                                          | 66.4 | 20.2  |
| 15    | 29.997                                          | .087                                      | .934    | .153    | 78.2                          | 88.8                                          | 69.2 | 19.6  |
| 16    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 17    | .905                                            | 29.981                                    | .866    | .115    | 79.8                          | 91.6                                          | 71.6 | 20.0  |
| 18    | .894                                            | .963                                      | .845    | .118    | 79.8                          | 90.4                                          | 71.6 | 18.8  |
| 19    | .932                                            | 30.011                                    | .879    | .132    | 78.9                          | 89.2                                          | 69.8 | 19.4  |
| 20    | .907                                            | 29.990                                    | .824    | .166    | 77.8                          | 89.5                                          | 67.6 | 21.9  |
| 21    | .845                                            | .924                                      | .770    | .154    | 79.5                          | 91.8                                          | 68.8 | 23.0  |
| 22    | .831                                            | .912                                      | .762    | .150    | 81.2                          | 94.6                                          | 69.0 | 25.6  |
| 23    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 24    | .869                                            | .941                                      | .810    | .131    | 81.0                          | 90.4                                          | 73.0 | 17.4  |
| 25    | .924                                            | 30.003                                    | .874    | .129    | 82.6                          | 91.6                                          | 74.9 | 16.7  |
| 26    | .862                                            | 29.933                                    | .783    | .150    | 82.0                          | 91.0                                          | 75.2 | 15.8  |
| 27    | .807                                            | .882                                      | .735    | .147    | 82.1                          | 89.6                                          | 75.4 | 14.2  |
| 28    | .858                                            | .919                                      | .782    | .137    | 82.4                          | 92.4                                          | 73.8 | 18.6  |
| 29    | .852                                            | .944                                      | .720    | .224    | 74.0                          | 86.0                                          | 64.5 | 21.5  |
| 30    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 31    | .859                                            | .927                                      | .798    | .129    | 75.8                          | 86.6                                          | 66.8 | 19.8  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1862.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 75.5                            | 6.2                 | 72.4                | 9.3                          | 0.785                            | 8.45                                             | 2.92                                                                    | 0.74                                                              |
| 2     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 3     | 62.8                            | 10.9                | 57.3                | 16.4                         | .478                             | 5.22                                             | 3.74                                                                    | .58                                                               |
| 4     | 62.7                            | 11.0                | 57.2                | 16.5                         | .476                             | .19                                              | .77                                                                     | .58                                                               |
| 5     | 68.2                            | 7.1                 | 64.6                | 10.7                         | .609                             | 6.63                                             | 2.77                                                                    | .71                                                               |
| 6     | 72.3                            | 5.3                 | 69.6                | 8.0                          | .717                             | 7.77                                             | .30                                                                     | .77                                                               |
| 7     | 73.3                            | 5.7                 | 70.4                | 8.6                          | .736                             | .95                                              | .55                                                                     | .76                                                               |
| 8     | 74.2                            | 5.8                 | 71.3                | 8.7                          | .758                             | 8.18                                             | .63                                                                     | .76                                                               |
| 9     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 10    | 72.8                            | 5.6                 | 70.0                | 8.4                          | .727                             | 7.87                                             | .44                                                                     | .76                                                               |
| 11    | 70.9                            | 5.7                 | 68.0                | 8.6                          | .681                             | .39                                              | .38                                                                     | .76                                                               |
| 12    | 66.6                            | 9.6                 | 61.8                | 14.4                         | .555                             | 6.04                                             | 3.62                                                                    | .63                                                               |
| 13    | 65.8                            | 10.1                | 60.7                | 15.2                         | .536                             | 5.82                                             | .75                                                                     | .61                                                               |
| 14    | 66.3                            | 9.8                 | 61.4                | 14.7                         | .548                             | .96                                              | .67                                                                     | .62                                                               |
| 15    | 67.4                            | 10.8                | 62.0                | 16.2                         | .559                             | 6.05                                             | 4.20                                                                    | .59                                                               |
| 16    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 17    | 69.1                            | 10.7                | 63.7                | 16.1                         | .591                             | .38                                              | .37                                                                     | .59                                                               |
| 18    | 68.6                            | 11.2                | 63.0                | 16.8                         | .578                             | .23                                              | .52                                                                     | .58                                                               |
| 19    | 66.7                            | 12.2                | 60.6                | 18.3                         | .534                             | 5.76                                             | .71                                                                     | .55                                                               |
| 20    | 65.8                            | 12.0                | 59.8                | 18.0                         | .520                             | .62                                              | .51                                                                     | .56                                                               |
| 21    | 66.9                            | 12.6                | 60.6                | 18.9                         | .534                             | .75                                              | .91                                                                     | .54                                                               |
| 22    | 69.0                            | 12.2                | 62.9                | 18.3                         | .576                             | 6.20                                             | 5.01                                                                    | .55                                                               |
| 23    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 24    | 74.2                            | 6.8                 | 70.8                | 10.2                         | .746                             | 8.04                                             | 3.10                                                                    | .72                                                               |
| 25    | 74.4                            | 8.2                 | 70.3                | 12.3                         | .734                             | 7.89                                             | .79                                                                     | .68                                                               |
| 26    | 74.8                            | 7.2                 | 71.2                | 10.8                         | .756                             | 8.12                                             | .35                                                                     | .71                                                               |
| 27    | 75.7                            | 6.4                 | 72.5                | 9.6                          | .787                             | .46                                              | .05                                                                     | .74                                                               |
| 28    | 72.2                            | 10.2                | 67.1                | 15.3                         | .661                             | 7.10                                             | 4.51                                                                    | .61                                                               |
| 29    | 69.6                            | 4.4                 | 67.4                | 6.6                          | .668                             | .29                                              | 1.75                                                                    | .81                                                               |
| 30    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 31    | 68.7                            | 7.1                 | 65.1                | 10.7                         | .619                             | 6.74                                             | 2.80                                                                    | .71                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahrt. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|--------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                  | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                          | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.898                                           | 29.998                                                       | 29.810  | 0.188   | 73.6                          | 78.2                                                                | 68.0 | 10.2  |
| 1              | .885                                             | .993                                                         | .770    | .223    | 73.1                          | 77.4                                                                | 67.4 | 10.0  |
| 2              | .880                                             | .990                                                         | .748    | .242    | 72.8                          | 77.2                                                                | 67.0 | 10.2  |
| 3              | .880                                             | .988                                                         | .742    | .246    | 72.1                          | 76.8                                                                | 65.8 | 11.0  |
| 4              | .873                                             | .983                                                         | .731    | .252    | 71.3                          | 76.2                                                                | 65.4 | 10.8  |
| 5              | .894                                             | 30.001                                                       | .737    | .264    | 70.9                          | 76.4                                                                | 65.2 | 11.2  |
| 6              | .912                                             | .023                                                         | .755    | .268    | 70.7                          | 76.4                                                                | 64.5 | 11.9  |
| 7              | .931                                             | .046                                                         | .763    | .283    | 71.3                          | 77.6                                                                | 64.8 | 12.8  |
| 8              | .957                                             | .088                                                         | .802    | .286    | 75.3                          | 81.0                                                                | 69.4 | 11.6  |
| 9              | .975                                             | .104                                                         | .812    | .292    | 78.3                          | 84.6                                                                | 70.4 | 14.2  |
| 10             | .977                                             | .115                                                         | .820    | .295    | 80.8                          | 86.0                                                                | 73.0 | 13.0  |
| 11             | .967                                             | .103                                                         | .798    | .305    | 83.8                          | 88.4                                                                | 78.6 | 9.8   |
| Noon.          | .942                                             | .077                                                         | .750    | .327    | 85.4                          | 90.6                                                                | 80.5 | 10.1  |
| 1              | .911                                             | .041                                                         | .724    | .317    | 86.4                          | 91.6                                                                | 77.2 | 14.4  |
| 2              | .880                                             | .010                                                         | .682    | .328    | 87.0                          | 93.2                                                                | 73.2 | 20.0  |
| 3              | .857                                             | 29.980                                                       | .663    | .317    | 87.5                          | 94.6                                                                | 75.8 | 18.8  |
| 4              | .845                                             | .970                                                         | .661    | .309    | 87.0                          | 93.2                                                                | 73.5 | 19.7  |
| 5              | .840                                             | .946                                                         | .660    | .286    | 85.4                          | 91.2                                                                | 76.6 | 14.6  |
| 6              | .847                                             | .944                                                         | .671    | .273    | 82.4                          | 86.6                                                                | 75.6 | 11.0  |
| 7              | .863                                             | .949                                                         | .678    | .271    | 79.7                          | 84.0                                                                | 66.2 | 17.8  |
| 8              | .883                                             | .992                                                         | .691    | .301    | 77.9                          | 82.0                                                                | 64.5 | 17.5  |
| 9              | .898                                             | 30.003                                                       | .714    | .289    | 76.4                          | 80.2                                                                | 64.6 | 15.6  |
| 10             | .905                                             | .009                                                         | .726    | .283    | 75.5                          | 79.8                                                                | 65.0 | 14.8  |
| 11             | .901                                             | .003                                                         | .728    | .275    | 74.5                          | 79.0                                                                | 64.8 | 14.2  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 68.8                            | 4.8                 | 66.4                | 7.2                          | 0.646                            | 7.07                                                  | 1.86                                                                     | 0.79                                                                 |
| 1              | 68.8                            | 4.3                 | 66.6                | 6.5                          | .651                             | .11                                                   | .68                                                                      | .81                                                                  |
| 2              | 68.6                            | 4.2                 | 66.5                | 6.3                          | .648                             | .10                                                   | .61                                                                      | .82                                                                  |
| 3              | 68.0                            | 4.1                 | 65.9                | 6.2                          | .636                             | 6.98                                                  | .55                                                                      | .82                                                                  |
| 4              | 67.5                            | 3.8                 | 65.6                | 5.7                          | .630                             | .92                                                   | .41                                                                      | .83                                                                  |
| 5              | 66.9                            | 4.0                 | 64.9                | 6.0                          | .615                             | .77                                                   | .46                                                                      | .82                                                                  |
| 6              | 66.7                            | 4.0                 | 64.7                | 6.0                          | .611                             | .72                                                   | .46                                                                      | .82                                                                  |
| 7              | 67.0                            | 4.3                 | 64.8                | 6.5                          | .613                             | .73                                                   | .60                                                                      | .81                                                                  |
| 8              | 68.5                            | 6.8                 | 65.1                | 10.2                         | .619                             | .75                                                   | 2.65                                                                     | .72                                                                  |
| 9              | 69.8                            | 8.5                 | 65.5                | 12.8                         | .628                             | .80                                                   | 3.48                                                                     | .66                                                                  |
| 10             | 70.3                            | 10.5                | 65.0                | 15.8                         | .617                             | .65                                                   | 4.42                                                                     | .60                                                                  |
| 11             | 70.6                            | 13.2                | 64.0                | 19.8                         | .597                             | .38                                                   | 5.72                                                                     | .53                                                                  |
|                |                                 |                     |                     |                              |                                  |                                                       |                                                                          |                                                                      |
| Noon.          | 71.0                            | 14.4                | 63.8                | 21.6                         | .593                             | .32                                                   | 6.36                                                                     | .50                                                                  |
| 1              | 71.4                            | 15.0                | 63.9                | 22.5                         | .595                             | .33                                                   | .73                                                                      | .49                                                                  |
| 2              | 71.6                            | 15.4                | 63.9                | 23.1                         | .595                             | .33                                                   | .96                                                                      | .48                                                                  |
| 3              | 71.7                            | 15.8                | 63.8                | 23.7                         | .593                             | .29                                                   | 7.20                                                                     | .47                                                                  |
| 4              | 71.8                            | 15.2                | 64.2                | 22.8                         | .601                             | .38                                                   | 6.91                                                                     | .48                                                                  |
| 5              | 71.5                            | 13.9                | 64.5                | 20.9                         | .607                             | .48                                                   | .20                                                                      | .51                                                                  |
| 6              | 71.6                            | 10.8                | 66.2                | 16.2                         | .642                             | .89                                                   | 4.72                                                                     | .59                                                                  |
| 7              | 71.1                            | 8.6                 | 66.8                | 12.9                         | .655                             | 7.07                                                  | 3.65                                                                     | .66                                                                  |
| 8              | 70.7                            | 7.2                 | 67.1                | 10.8                         | .661                             | .16                                                   | .00                                                                      | .71                                                                  |
| 9              | 70.4                            | 6.0                 | 67.4                | 9.0                          | .668                             | .26                                                   | 2.46                                                                     | .75                                                                  |
| 10             | 70.0                            | 5.5                 | 67.2                | 8.3                          | .664                             | .23                                                   | .23                                                                      | .76                                                                  |
| 11             | 69.6                            | 4.9                 | 67.1                | 7.4                          | .661                             | .22                                                   | 1.96                                                                     | .79                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                 |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches                          |                                   |                                                                                                            |
| 1     | 140.5                 | ...                             | S.                                | Cloudless.                                                                                                 |
| 2     | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 3     | 134.0                 | ...                             | N. & S. W.                        | Cloudless.                                                                                                 |
| 4     | 136.0                 | ...                             | S. W.                             | Cloudless.                                                                                                 |
| 5     | 139.0                 | ...                             | S. W. & S.                        | Cloudless till 9 A. M. Scatd. ∩i & ∪i till 7 P. M. cloudless afterwards.                                   |
| 6     | 122.4                 | ...                             | S.                                | Cloudless till 7 A. M. Scatd. clouds till 7 P. M. cloudless afterwards; also slightly drizzling at 7 P. M. |
| 7     | 135.0                 | ...                             | S.                                | Scatd. ∩i & ∪i.                                                                                            |
| 8     | 133.4                 | ...                             | S.                                | Cloudless till 8 A. M. Scatd. ∩i & ∪i till 5 P. M. cloudless afterwards.                                   |
| 9     | <i>Sunday.</i>        | ...                             |                                   |                                                                                                            |
| 10    | 130.0                 | 0.11                            | S. & S. W.                        | Cloudless till 7 A. M. Scatd. ∩i & ∪i till 3 P. M. cloudy afterwards; also raining at 9 P. M.              |
| 11    | 131.0                 | ...                             | N. & S. E. & S.                   | Cloudy till 9 A. M. Scatd. ∩i till 4 P. M. cloudless afterwards.                                           |
| 12    | 130.0                 | ...                             | N. & W.                           | Scatd. ∪i & ∩i till 7 A. M. cloudless afterwards; also foggy at 10 & 11 P. M.                              |
| 13    | 135.0                 | ...                             | N. & N. E.                        | Cloudless.                                                                                                 |
| 14    | 136.0                 | ...                             | E. & N. E. & N. W.                | Cloudless till 7 P. M. Scatd. ∩i afterwards.                                                               |
| 15    | 135.5                 | ...                             | N. W. & N.                        | Scatd. ∩i till 8 P. M. cloudless afterwards.                                                               |
| 16    | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 17    | 140.0                 | ...                             | E. & W.                           | Cloudless till 1 P. M. cloudy afterwards.                                                                  |
| 18    | 136.0                 | ...                             | W. & S. W.                        | Scatd. ∩i till 4 A. M. cloudless till 10 A. M. Scatd. ∩i till 5 P. M. cloudless afterwards.                |
| 19    | 136.0                 | ...                             | N. W. & N.                        | Cloudless till 7 A. M. Scatd. ∩i & ∩i till 6 P. M. cloudless afterwards.                                   |
| 20    | 136.0                 | ...                             | S. W. & N.                        | Cloudless.                                                                                                 |
| 21    | 137.4                 | ...                             | N.                                | Cloudless.                                                                                                 |
| 22    | 143.0                 | ...                             | S. E. & N.                        | Cloudless till 1 P. M. Scatd. ∩i afterwards.                                                               |
| 23    | <i>Sunday.</i>        |                                 |                                   |                                                                                                            |
| 24    | 139.4                 | ...                             | S.                                | Cloudless till 8 A. M. Scatd. clouds till 8 P. M. cloudless afterwards.                                    |
| 25    | 135.0                 | ...                             | S.                                | Cloudless till 5 A. M. Scatd. ∪i & ∩i till 1 P. M. cloudless afterwards.                                   |
| 26    | 135.0                 | ...                             | S. & S. W.                        | Cloudless.                                                                                                 |
| 27    | 129.0                 | ...                             | S. & S. W.                        | Scatd. ∪i & ∩i till 3 P. M. cloudy afterwards.                                                             |

∩i Cirri, ∩i Cirro strati, ∪i Cumuli, ∩i Cumulo strati, ∩i Nimbi, —i Strati, ∩i Cirro cumuli.

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taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                          |
|-------|-----------------------|---------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------|
| 28    | 135.0                 | ...                             | E. & S.                           | Cloudless till 1 P. M. Scatd. $\cap$ i & $\cup$ i till 6 P. M. cloudless afterwards.                |
| 29    | 135.0                 | 1.58                            | E.                                | Cloudless till 9 A. M. cloudy afterwards; also rain with thunder and lightning from Noon to 9 P. M. |
| 30    | Sunday.               | ...                             |                                   |                                                                                                     |
| 31    | 126.0                 | ...                             | S. & E. & S. E.                   | Cloudless.                                                                                          |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1862.*

MONTHLY RESULTS.

|                                                                |    |    | Inches. |
|----------------------------------------------------------------|----|----|---------|
| Mean height of the Barometer for the month,                    | .. | .. | 29 900  |
| Max. height of the Barometer occurred at 10 A. M. on the 14th, | .. | .. | 30.115  |
| Min. height of the Barometer occurred at 5 P. M. on the 1st,   | .. | .. | 29.660  |
| <i>Extreme range</i> of the Barometer during the month,        | .. | .. | 0.455   |
| Mean of the daily Max. Pressures,                              | .. | .. | 29.980  |
| Ditto ditto Min. ditto,                                        | .. | .. | 29.832  |
| <i>Mean daily range</i> of the Barometer during the month,     | .. | .. | 0.148   |

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|                                                                   |    |    | °    |
|-------------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                          | .. | .. | 78.4 |
| Max. Temperature occurred at 3 P. M. on the 22nd,                 | .. | .. | 94.6 |
| Min. Temperature occurred at 6 A. M. & 8 P. M. on the 4th & 29th, | .. | .. | 64.5 |
| <i>Extreme range</i> of the Temperature during the month,         | .. | .. | 30.1 |
| Mean of the daily Max. Temperature,                               | .. | .. | 88.3 |
| Ditto ditto Min. ditto,                                           | .. | .. | 70.3 |
| <i>Mean daily range</i> of the Temperature during the month,      | .. | .. | 18.0 |

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|                                                            |    |    | °      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 69.8   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 8.6    |
| Computed Mean Dew-point for the month,                     | .. | .. | 6.55   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 12.9   |
|                                                            |    |    | Inches |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.628  |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 6.80         |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 3.51         |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.66         |

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|                                                   |    |    | Inches.        |
|---------------------------------------------------|----|----|----------------|
| Rained 3 days, Max. fall of rain during 24 hours, | .. | .. | 1.58           |
| Total amount of rain during the month,            | .. | .. | 1.69           |
| Prevailing direction of the Wind,                 | .. | .. | S. & N. & S.W. |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1862.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N. | Rain on. | N. E. | Rain on. | E. | Rain on.     | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|----|----------|-------|----------|----|--------------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           |    |          |       |          |    | No. of days. |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 3  |          |       |          | 3  |              | 2     |          | 9  |          | 4     |          | 1  |          |       |          |       |          | 4       |
| 1         | 4  |          |       |          | 4  |              | 1     |          | 11 |          | 4     |          | 1  |          |       |          |       |          | 1       |
| 2         | 4  |          | 1     |          | 4  |              | 1     |          | 10 |          | 3     |          | 1  |          | 1     |          |       |          | 1       |
| 3         | 4  |          | 1     |          | 5  |              |       |          | 9  |          | 4     |          |    |          | 1     |          |       |          | 2       |
| 4         | 4  |          | 1     |          | 2  |              |       |          | 9  |          | 4     |          | 1  |          | 1     |          |       |          | 4       |
| 5         | 6  |          | 1     |          | 3  |              |       |          | 9  |          | 4     |          | 1  |          | 1     |          |       |          | 1       |
| 6         | 6  |          | 1     |          | 3  |              |       |          | 8  |          | 5     |          | 2  |          | 1     |          |       |          |         |
| 7         | 6  |          |       |          | 5  |              | 1     |          | 6  |          | 5     |          | 3  |          |       |          |       |          |         |
| 8         | 8  |          |       |          | 1  |              | 2     |          | 7  |          | 3     |          | 1  |          |       |          |       |          |         |
| 9         | 9  |          |       |          | 2  |              | 2     |          | 4  |          | 6     |          | 2  |          | 1     |          |       |          | 4       |
| 10        | 7  |          | 1     |          | 3  |              | 2     |          | 5  |          | 7     |          |    |          | 1     |          |       |          |         |
| 11        | 8  |          | 1     |          | 3  |              | 3     |          | 3  |          | 7     |          | 1  |          |       |          |       |          |         |
| Noon.     | 4  |          |       |          | 2  | 1            | 2     |          | 4  |          | 5     |          | 5  |          | 4     |          |       |          |         |
| 1         | 5  |          | 3     |          | 1  |              | 1     |          | 5  |          | 6     | 1        | 1  |          | 5     |          |       |          |         |
| 2         | 2  |          | 1     |          | 1  |              | 3     |          | 7  |          | 5     |          | 2  |          | 5     |          |       |          |         |
| 3         | 3  |          | 1     |          | 1  |              | 2     |          | 6  | 1        | 6     |          | 3  |          | 4     |          |       |          |         |
| 4         | 3  |          | 2     |          |    |              | 1     |          | 5  | 1        | 7     |          | 2  |          | 6     |          |       |          |         |
| 5         | 3  |          |       |          | 2  |              | 2     |          | 10 |          | 3     |          | 2  |          | 3     |          |       |          | 1       |
| 6         | 3  |          |       |          | 2  |              | 3     |          | 9  |          | 3     |          | 3  |          | 3     |          |       |          |         |
| 7         | 4  |          |       |          | 2  |              | 3     | 1        | 10 | 1        | 2     |          | 2  |          | 3     |          |       |          |         |
| 8         | 2  |          |       |          | 4  | 1            | 2     |          | 12 |          | 2     |          | 2  |          | 2     |          |       |          |         |
| 9         | 3  | 1        |       |          | 4  | 1            | 2     |          | 11 |          | 2     |          | 2  |          | 2     |          |       |          |         |
| 10        | 3  |          |       |          | 4  |              | 2     |          | 11 |          | 2     |          | 2  |          | 2     |          |       |          |         |
| 11        | 2  |          |       |          | 4  |              | 2     |          | 11 |          | 2     |          | 2  |          | 2     |          |       |          | 1       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1862.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.809                                          | 29.888                                    | 29.707  | 0.181   | 79.9                          | 88.8                                          | 70.9 | 17.9  |
| 2     | .761                                            | .842                                      | .682    | .160    | 83.4                          | 92.6                                          | 77.2 | 15.4  |
| 3     | .763                                            | .831                                      | .691    | .140    | 82.6                          | 90.8                                          | 76.4 | 14.4  |
| 4     | .805                                            | .873                                      | .755    | .118    | 82.1                          | 91.0                                          | 75.0 | 16.0  |
| 5     | .844                                            | .911                                      | .794    | .117    | 84.0                          | 92.8                                          | 77.6 | 15.2  |
| 6     | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 7     | .786                                            | .859                                      | .702    | .157    | 87.0                          | 97.6                                          | 78.2 | 19.4  |
| 8     | .783                                            | .876                                      | .699    | .177    | 87.1                          | 97.4                                          | 79.0 | 18.4  |
| 9     | .792                                            | .874                                      | .725    | .149    | 86.7                          | 96.2                                          | 79.0 | 17.2  |
| 10    | .810                                            | .876                                      | .740    | .136    | 85.5                          | 93.8                                          | 77.8 | 16.0  |
| 11    | .838                                            | .925                                      | .776    | .149    | 85.6                          | 97.0                                          | 74.6 | 22.4  |
| 12    | .875                                            | .959                                      | .819    | .140    | 86.2                          | 97.0                                          | 77.0 | 20.0  |
| 13    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 14    | .796                                            | .878                                      | .691    | .187    | 87.8                          | 100.2                                         | 77.2 | 23.0  |
| 15    | .734                                            | .812                                      | .645    | .167    | 88.7                          | 99.8                                          | 79.2 | 20.6  |
| 16    | .697                                            | .778                                      | .613    | .165    | 88.3                          | 99.5                                          | 80.2 | 19.3  |
| 17    | .680                                            | .748                                      | .580    | .168    | 86.8                          | 95.8                                          | 81.6 | 14.2  |
| 18    | .711                                            | .766                                      | .658    | .108    | 86.2                          | 95.2                                          | 79.8 | 15.4  |
| 19    | .700                                            | .765                                      | .631    | .134    | 85.4                          | 92.4                                          | 79.8 | 12.6  |
| 20    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 21    | .786                                            | .860                                      | .715    | .145    | 85.6                          | 91.2                                          | 81.8 | 9.4   |
| 22    | .812                                            | .885                                      | .739    | .146    | 84.1                          | 91.4                                          | 75.0 | 16.4  |
| 23    | .784                                            | .858                                      | .707    | .151    | 83.5                          | 92.2                                          | 76.2 | 16.0  |
| 24    | .726                                            | .780                                      | .619    | .161    | 83.9                          | 91.2                                          | 76.2 | 15.0  |
| 25    | .668                                            | .750                                      | .561    | .189    | 82.1                          | 92.2                                          | 72.4 | 19.8  |
| 26    | .616                                            | .717                                      | .536    | .181    | 83.5                          | 90.4                                          | 76.8 | 13.6  |
| 27    | Sunday.                                         |                                           |         |         |                               |                                               |      |       |
| 28    | .637                                            | .697                                      | .576    | .121    | 82.6                          | 89.2                                          | 75.8 | 13.4  |
| 29    | .658                                            | .714                                      | .604    | .110    | 81.2                          | 89.6                                          | 70.7 | 18.9  |
| 30    | .686                                            | .771                                      | .543    | .228    | 80.3                          | 89.6                                          | 72.5 | 17.1  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1862.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 74.4                            | 5.5                 | 71.6                | 8.3                          | 0.766                            | 8.27                                             | 2.51                                                                    | 0.77                                                                |
| 2     | 77.5                            | 5.9                 | 74.5                | 8.9                          | .840                             | 9.01                                             | .95                                                                     | .75                                                                 |
| 3     | 77.6                            | 5.0                 | 75.1                | 7.5                          | .857                             | .19                                              | .49                                                                     | .79                                                                 |
| 4     | 76.8                            | 5.3                 | 74.1                | 8.0                          | .830                             | 8.92                                             | .59                                                                     | .78                                                                 |
| 5     | 78.3                            | 5.7                 | 75.4                | 8.6                          | .865                             | 9.26                                             | .91                                                                     | .76                                                                 |
| 6     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 7     | 76.6                            | 10.4                | 71.4                | 15.6                         | .761                             | 8.08                                             | 5.21                                                                    | .61                                                                 |
| 8     | 76.5                            | 10.6                | 71.2                | 15.9                         | .756                             | .03                                              | .30                                                                     | .60                                                                 |
| 9     | 74.8                            | 11.9                | 68.8                | 17.9                         | .699                             | 7.43                                             | .75                                                                     | .56                                                                 |
| 10    | 75.0                            | 10.5                | 69.7                | 15.8                         | .720                             | .68                                              | .04                                                                     | .60                                                                 |
| 11    | 73.4                            | 12.2                | 67.3                | 18.3                         | .666                             | .10                                              | .66                                                                     | .56                                                                 |
| 12    | 74.9                            | 11.3                | 69.2                | 17.0                         | .708                             | .54                                              | .45                                                                     | .58                                                                 |
| 13    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 14    | 76.5                            | 11.3                | 70.8                | 17.0                         | .746                             | .92                                              | .68                                                                     | .58                                                                 |
| 15    | 77.2                            | 11.5                | 71.4                | 17.3                         | .761                             | 8.07                                             | .89                                                                     | .58                                                                 |
| 16    | 78.8                            | 9.5                 | 74.0                | 14.3                         | .827                             | .79                                              | .01                                                                     | .64                                                                 |
| 17    | 80.1                            | 6.7                 | 76.7                | 10.1                         | .902                             | 9.60                                             | 3.61                                                                    | .73                                                                 |
| 18    | 79.2                            | 7.0                 | 75.7                | 10.5                         | .873                             | .30                                              | .69                                                                     | .72                                                                 |
| 19    | 78.8                            | 6.6                 | 75.5                | 9.9                          | .868                             | .27                                              | .41                                                                     | .73                                                                 |
| 20    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 21    | 79.0                            | 6.6                 | 75.7                | 9.9                          | .873                             | .32                                              | .44                                                                     | .73                                                                 |
| 22    | 78.3                            | 5.8                 | 75.4                | 8.7                          | .865                             | .26                                              | 2.95                                                                    | .76                                                                 |
| 23    | 77.5                            | 6.0                 | 74.5                | 9.0                          | .840                             | .01                                              | .99                                                                     | .75                                                                 |
| 24    | 77.3                            | 6.6                 | 74.0                | 9.9                          | .827                             | 8.86                                             | 3.27                                                                    | .73                                                                 |
| 25    | 75.6                            | 6.5                 | 72.3                | 9.8                          | .783                             | .41                                              | .10                                                                     | .73                                                                 |
| 26    | 76.4                            | 7.1                 | 72.8                | 10.7                         | .795                             | .52                                              | .48                                                                     | .71                                                                 |
| 27    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 28    | 77.7                            | 4.9                 | 75.2                | 7.4                          | .860                             | 9.24                                             | 2.44                                                                    | .79                                                                 |
| 29    | 76.2                            | 5.0                 | 73.7                | 7.5                          | .819                             | 8.82                                             | .39                                                                     | .79                                                                 |
| 30    | 75.0                            | 5.3                 | 72.3                | 8.0                          | .783                             | .44                                              | .47                                                                     | .77                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>for each hour during<br>the month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                           | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | °                             | °                                                              | °    | °     |
| Mid-<br>night. | 29.757                                          | 29.871                                                       | 29.589  | 0.282   | 79.9                          | 83.2                                                           | 75.0 | 8.2   |
| 1              | .746                                            | .862                                                         | .584    | .278    | 79.3                          | 82.8                                                           | 71.2 | 11.6  |
| 2              | .738                                            | .844                                                         | .576    | .268    | 79.1                          | 83.0                                                           | 71.0 | 12.0  |
| 3              | .732                                            | .839                                                         | .587    | .252    | 78.5                          | 82.6                                                           | 71.0 | 11.6  |
| 4              | .729                                            | .825                                                         | .608    | .217    | 78.4                          | 82.0                                                           | 70.9 | 11.1  |
| 5              | .748                                            | .844                                                         | .625    | .219    | 78.0                          | 81.9                                                           | 71.2 | 10.7  |
| 6              | .767                                            | .872                                                         | .636    | .236    | 78.0                          | 81.8                                                           | 71.2 | 10.6  |
| 7              | .786                                            | .905                                                         | .643    | .262    | 79.0                          | 82.2                                                           | 73.2 | 9.0   |
| 8              | .807                                            | .923                                                         | .656    | .267    | 81.7                          | 84.4                                                           | 77.5 | 6.9   |
| 9              | .823                                            | .959                                                         | .690    | .269    | 85.6                          | 89.8                                                           | 80.6 | 9.2   |
| 10             | .820                                            | .954                                                         | .667    | .287    | 88.0                          | 91.4                                                           | 84.2 | 7.2   |
| 11             | .809                                            | .948                                                         | .666    | .282    | 90.1                          | 95.0                                                           | 86.0 | 9.0   |
| Noon.          | .791                                            | .929                                                         | .655    | .274    | 91.5                          | 96.8                                                           | 87.0 | 9.8   |
| 1              | .764                                            | .901                                                         | .621    | .280    | 92.6                          | 98.6                                                           | 87.8 | 10.8  |
| 2              | .732                                            | .881                                                         | .582    | .299    | 93.2                          | 99.8                                                           | 88.2 | 11.6  |
| 3              | .705                                            | .853                                                         | .568    | .285    | 93.1                          | 100.2                                                          | 87.8 | 12.4  |
| 4              | .681                                            | .830                                                         | .543    | .287    | 92.4                          | 100.2                                                          | 85.8 | 14.4  |
| 5              | .682                                            | .821                                                         | .541    | .280    | 90.2                          | 98.4                                                           | 78.6 | 19.8  |
| 6              | .692                                            | .830                                                         | .536    | .294    | 87.6                          | 94.8                                                           | 74.0 | 20.8  |
| 7              | .713                                            | .844                                                         | .563    | .281    | 85.4                          | 91.6                                                           | 71.0 | 20.6  |
| 8              | .740                                            | .866                                                         | .585    | .281    | 83.2                          | 87.6                                                           | 70.7 | 16.9  |
| 9              | .756                                            | .884                                                         | .586    | .298    | 82.0                          | 87.3                                                           | 72.6 | 14.7  |
| 10             | .759                                            | .892                                                         | .556    | .336    | 81.0                          | 85.0                                                           | 72.5 | 12.5  |
| 11-            | .757                                            | .888                                                         | .611    | .277    | 80.5                          | 84.5                                                           | 73.0 | 11.5  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb<br>Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a Cubic foot<br>of air. | Additional Weight of<br>Vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete satu-<br>ration being unity. |
|----------------|-------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                             | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                           |                                                                     |
| Mid-<br>night. | 76.0                          | 3.9                 | 74.0                | 5.9                          | 0.827                            | 8.93                                                  | 1.85                                                                | 0.83                                                                |
| 1              | 75.6                          | 3.7                 | 73.7                | 5.6                          | .819                             | .85                                                   | .74                                                                 | .84                                                                 |
| 2              | 75.4                          | 3.7                 | 73.5                | 5.6                          | .814                             | .79                                                   | .74                                                                 | .84                                                                 |
| 3              | 75.1                          | 3.4                 | 73.4                | 5.1                          | .811                             | .78                                                   | .57                                                                 | .85                                                                 |
| 4              | 75.1                          | 3.3                 | 73.4                | 5.0                          | .811                             | .78                                                   | .53                                                                 | .85                                                                 |
| 5              | 74.8                          | 3.2                 | 73.2                | 4.8                          | .806                             | .73                                                   | .46                                                                 | .86                                                                 |
| 6              | 74.8                          | 3.2                 | 73.2                | 4.8                          | .806                             | .73                                                   | .46                                                                 | .86                                                                 |
| 7              | 75.6                          | 3.4                 | 73.9                | 5.1                          | .824                             | .92                                                   | .58                                                                 | .85                                                                 |
| 8              | 77.0                          | 4.7                 | 74.6                | 7.1                          | .843                             | 9.07                                                  | 2.30                                                                | .80                                                                 |
| 9              | 78.0                          | 7.6                 | 74.2                | 11.4                         | .832                             | 8.89                                                  | 3.87                                                                | .70                                                                 |
| 10             | 78.1                          | 9.9                 | 73.1                | 14.9                         | .803                             | .53                                                   | 5.15                                                                | .62                                                                 |
| 11             | 78.4                          | 11.7                | 72.5                | 17.6                         | .787                             | .32                                                   | 6.22                                                                | .57                                                                 |
|                |                               |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| Noon.          | 78.4                          | 13.1                | 71.8                | 19.7                         | .771                             | .11                                                   | 7.04                                                                | .54                                                                 |
| 1              | 78.6                          | 14.0                | 71.6                | 21.0                         | .766                             | .05                                                   | .58                                                                 | .52                                                                 |
| 2              | 78.7                          | 14.5                | 71.4                | 21.8                         | .761                             | 7.98                                                  | .92                                                                 | .50                                                                 |
| 3              | 78.6                          | 14.5                | 71.3                | 21.8                         | .758                             | .96                                                   | .90                                                                 | .50                                                                 |
| 4              | 78.4                          | 14.0                | 71.4                | 21.0                         | .761                             | 8.00                                                  | .54                                                                 | .52                                                                 |
| 5              | 78.4                          | 11.8                | 72.5                | 17.7                         | .787                             | .32                                                   | 6.27                                                                | .57                                                                 |
| 6              | 78.0                          | 9.6                 | 73.2                | 14.4                         | .806                             | .57                                                   | 4.95                                                                | .63                                                                 |
| 7              | 77.6                          | 7.8                 | 73.7                | 11.7                         | .819                             | .74                                                   | 3.94                                                                | .69                                                                 |
| 8              | 76.5                          | 6.7                 | 73.1                | 10.1                         | .803                             | .61                                                   | .28                                                                 | .72                                                                 |
| 9              | 76.3                          | 5.7                 | 73.4                | 8.6                          | .811                             | .71                                                   | 2.76                                                                | .76                                                                 |
| 10             | 75.9                          | 5.1                 | 73.3                | 7.7                          | .809                             | .70                                                   | .44                                                                 | .78                                                                 |
| 11             | 75.7                          | 4.8                 | 73.3                | 7.2                          | .809                             | .72                                                   | .26                                                                 | .79                                                                 |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                         |
|-------|-----------------------|---------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                                    |
| 1     | 128.0                 | ...                             | S.                                | Scatd. clouds till 3 P. M. cloudless afterwards.                                                   |
| 2     | 132.0                 | ...                             | S.                                | Cloudless till 7 A. M. Scatd. ∩i till 3 P. M. cloudless afterwards.                                |
| 3     | 127.0                 | ...                             | S.                                | Cloudless till 5 A. M. Scatd. ∩i till 3 P. M. cloudy afterwards; also drizzling at 6 & 10 P. M.    |
| 4     | 121.8                 | ...                             | S.                                | Cloudless till 6 P. M. Scatd. ∩i & ∩i afterwards.                                                  |
| 5     | 128.0                 | ...                             | S.                                | Scatd. clouds till 6 P. M. cloudless afterwards.                                                   |
| 6     |                       |                                 | <i>Sunday.</i>                    |                                                                                                    |
| 7     | 132.0                 | ...                             | S. W.                             | Cloudless till 5 A. M. Scatd. ∩i till Noon, cloudless afterwards.                                  |
| 8     | 133.4                 | ...                             | S. W. & W.                        | Cloudless till 5 A. M. Scatd. ∩i till 11 A. M. cloudless afterwards.                               |
| 9     | 131.0                 | ...                             | S. W. & S. & W.                   | Cloudless till 5 A. M. Scatd. ∩i & ∩i till 6 P. M. cloudless afterwards.                           |
| 10    | 127.0                 | ...                             | W. & S.                           | Scatd. ∩i & ∩i till 7 A. M. cloudless 11 A. M. Scatd. ∩i afterwards.                               |
| 11    | 140.0                 | ...                             | S. & S. W.                        | Cloudless.                                                                                         |
| 12    | 137.4                 | ...                             | S & S. W.                         | Cloudless.                                                                                         |
| 13    |                       |                                 | <i>Sunday.</i>                    |                                                                                                    |
| 14    | 140.0                 | ...                             | S. & S. W.                        | Cloudless.                                                                                         |
| 15    | 138.0                 | ...                             | S. & W.                           | Cloudless.                                                                                         |
| 16    | 137.0                 | ...                             | S.                                | Cloudless.                                                                                         |
| 17    | 134.4                 | ...                             | S.                                | Scatd. ∩i & ∩i.                                                                                    |
| 18    | 131.8                 | ...                             | S. & S. W.                        | Cloudless.                                                                                         |
| 19    | 137.0                 | ...                             | S.                                | Scattered clouds till 3 P. M. cloudless afterwards.                                                |
| 20    |                       |                                 | <i>Sunday.</i>                    |                                                                                                    |
| 21    | 128.0                 | ...                             | S.                                | Scattered clouds till 6 P. M. cloudless afterwards.                                                |
| 22    | 118.0                 | 0.11                            | S. & S. E.                        | Scatd. ∩i & ∩i till 2 P. M. cloudy afterwards; also raining between 9 & 10 P. M.                   |
| 23    | 125.4                 | ...                             | S. & S. E.                        | Cloudless till 8 A. M. Scatd. ∩i till 2 P. M. cloudy afterwards.                                   |
| 24    | 133.0                 | 0.12                            | S.                                | Scatd. ∩i 3 P. M. cloudy afterwards; also thunder, & lightning & a little rain between 8 & 9 P. M. |

∩i Cirri, ∩i Cirro strati, ∩i Cumuli, ∩i Cumulo strati, ∩i Nimbi, —i Strati, ∩i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1861.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                        |
|-------|-----------------------|---------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|       | o                     | Inches.                         |                                   |                                                                                                                                   |
| 25    | 127.8                 | 0.38                            | S. & E.                           | Cloudless till 5 A. M. Scatd. ∩i & ∪i till 6 P. M. cloudy afterwards; also thundering & lightning & raining between 10 & 11 P. M. |
| 26    | 121.0                 | ...                             | S. & S. E.                        | Cloudy till 2 A. M. cloudless till 8 A. M. Scattered ∪i & ∩i till 2 P. M. cloudy afterwards.                                      |
| 27    |                       | 0.60                            | <i>Sunday.</i>                    |                                                                                                                                   |
| 28    | 115.0                 |                                 | S. & Calm.                        | Cloudless till 3 A. M. cloudy till 11 A. M. Scatd. ∩i & ∪i afterwards; also slightly drizzling at Noon & 10 P. M.                 |
| 29    | 126.0                 | 0.68                            | S. & N. & E.                      | Cloudless till 5 A. M. cloudy afterwards, also raining between 5 & 9 P. M.                                                        |
| 30    |                       | 0.64                            | S. & S. E.                        | Cloudy till Noon, Scatd. ∩i till 6 P. M. cloudy afterwards; also thunder & lightning, accompanied with rain between 8 & 9 P. M.   |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1862.*

MONTHLY RESULTS.

|                                                                  | Inches |
|------------------------------------------------------------------|--------|
| Mean height of the Barometer for the month, .. ..                | 29.752 |
| Max. height of the Barometer occurred at 9 A. M. on the 12th, .. | 29.959 |
| Min. height of the Barometer occurred at 6 P. M. on the 26th, .. | 29.536 |
| <i>Extreme range</i> of the Barometer during the month, .. ..    | 0.423  |
| Mean of the Daily Max. Pressures, . .. ..                        | 29.827 |
| Ditto ditto Min. ditto, .. ..                                    | 29.673 |
| <i>Mean daily range</i> of the Barometer during the month, .. .. | 0.154  |

|                                                                    | °     |
|--------------------------------------------------------------------|-------|
| Mean Dry Bulb Thermometer for the month, .. ..                     | 84.6  |
| Max. Temperature occurred at 3 & 4 P. M. on the 14th, .. ..        | 100.2 |
| Min. Temperature occurred at 8 P. M. on the 29th, .. ..            | 70.7  |
| <i>Extreme range</i> of the Temperature during the month, .. ..    | 29.5  |
| Mean of the daily Max. Temperature, .. ..                          | 93.7  |
| Ditto ditto Min. ditto, .. ..                                      | 76.8  |
| <i>Mean daily range</i> of the Temperature during the month, .. .. | 16.9  |
| Mean Wet Bulb Thermometer for the month, .. ..                     | 76.9  |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..      | 7.7   |
| Computed Mean Dew-point for the month, .. ..                       | 73.0  |
| Mean Dry Bulb Thermometer above computed Mean Dew-point, ..        | 11.6  |

|                                                   | Inches |
|---------------------------------------------------|--------|
| Mean Elastic force of Vapour for the month, .. .. | 0.801  |

|                                                                         | Troy grains |
|-------------------------------------------------------------------------|-------------|
| Mean Weight of Vapour for the month, .. ..                              | 8.55        |
| Additional Weight of Vapour required for complete saturation, ..        | 3.84        |
| Mean degree of humidity for the month, complete saturation being unity, | 0.69        |

|                                                         | Inches     |
|---------------------------------------------------------|------------|
| Rained 8 days, Max. fall of rain during 24 hours, .. .. | 0.68       |
| Total amount of rain during the month, .. ..            | 2.53       |
| Prevailing direction of the Wind, .. ..                 | S. & S. W. |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of April, 1862.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. | 1            |          |       |          |    |          | 2     |          | 12 |          | 3     |          | 1  |          |       |          | 2     |          | 5       |
| 1         | 1            |          |       |          | 1  |          | 2     |          | 14 |          | 4     |          | 1  |          |       |          | 2     |          | 1       |
| 2         | 1            |          |       |          | 1  |          | 3     |          | 15 |          | 4     |          | 1  |          |       |          | 1     |          |         |
| 3         |              |          |       |          | 1  |          | 2     |          | 14 |          | 3     |          | 3  |          |       |          | 1     |          | 2       |
| 4         |              |          |       |          | 1  |          | 2     |          | 13 |          | 3     |          | 2  |          |       |          | 1     |          | 4       |
| 5         |              |          |       |          | 3  |          | 1     |          | 15 |          | 3     |          | 3  |          |       |          | 1     |          |         |
| 6         |              |          |       |          | 2  |          | 1     |          | 15 |          | 5     |          | 2  |          | 1     |          |       |          |         |
| 7         |              |          |       |          | 2  |          | 1     |          | 16 |          | 4     |          | 2  |          | 1     |          |       |          |         |
| 8         |              |          |       |          | 1  |          | 2     |          | 18 |          | 3     |          | 1  |          |       |          |       |          | 1       |
| 9         |              |          |       |          |    |          | 1     |          | 19 |          | 4     |          | 2  |          |       |          |       |          |         |
| 10        |              |          |       |          |    |          | 1     |          | 17 |          | 6     |          | 2  |          |       |          |       |          |         |
| 11        |              |          |       |          |    |          |       |          | 17 |          | 6     |          | 2  |          | 1     |          |       |          |         |
| Noon.     | 1            |          |       |          |    |          |       |          | 17 | 1        | 6     |          | 2  |          |       |          |       |          |         |
| 1         |              |          |       |          |    |          | 1     |          | 16 |          | 6     |          | 2  |          | 1     |          |       |          |         |
| 2         |              |          |       |          |    |          | 2     |          | 16 |          | 4     |          | 4  |          |       |          |       |          |         |
| 3         |              |          |       |          |    |          | 1     |          | 14 |          | 6     |          | 4  |          |       |          |       |          | 1       |
| 4         |              |          |       |          |    |          | 1     |          | 16 |          | 4     |          | 3  |          | 1     |          |       |          | 1       |
| 5         | 1            | 1        |       |          | 1  |          |       |          | 18 |          | 3     |          | 3  |          |       |          |       |          |         |
| 6         | 1            | 1        |       |          |    |          | 1     |          | 17 | 1        | 4     |          | 3  |          |       |          |       |          |         |
| 7         | 1            | 1        |       |          |    |          | 1     |          | 18 |          | 3     |          | 3  |          |       |          |       |          |         |
| 8         | 1            | 1        |       |          |    |          | 2     | 1        | 20 | 1        | 1     |          | 2  |          |       |          |       |          |         |
| 9         | 2            | 1        |       |          | 1  |          | 3     | 1        | 17 | 1        | 2     |          |    |          | 1     |          |       |          |         |
| 10        | 1            |          |       |          | 1  |          | 3     | 1        | 17 | 2        | 1     |          |    |          | 2     | 1        |       |          | 1       |
| 11        | 1            |          |       |          | 1  | 1        | 3     |          | 18 |          | 2     |          |    |          | 1     |          |       |          |         |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1862.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | 29.647                                          | 29.740                                    | 29.556  | 0.184   | 80.7                          | 88.5                                          | 72.6 | 15.9  |
| 2     | .665                                            | .730                                      | .607    | .123    | 84.7                          | 93.2                                          | 78.4 | 14.8  |
| 3     | .692                                            | .767                                      | .629    | .138    | 83.1                          | 90.4                                          | 73.0 | 17.4  |
| 4     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 5     | .776                                            | .851                                      | .704    | .147    | 83.4                          | 91.8                                          | 74.0 | 17.8  |
| 6     | .822                                            | .919                                      | .750    | .169    | 77.0                          | 83.2                                          | 72.2 | 11.0  |
| 7     | .764                                            | .828                                      | .697    | .131    | 82.2                          | 90.5                                          | 74.4 | 16.1  |
| 8     | .791                                            | .873                                      | .724    | .149    | 81.8                          | 88.4                                          | 75.0 | 13.4  |
| 9     | .791                                            | .875                                      | .719    | .156    | 85.0                          | 93.5                                          | 78.6 | 14.9  |
| 10    | .775                                            | .834                                      | .710    | .124    | 84.5                          | 91.4                                          | 79.6 | 11.8  |
| 11    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 12    | .666                                            | .740                                      | .572    | .168    | 83.3                          | 92.4                                          | 74.8 | 17.6  |
| 13    | .654                                            | .722                                      | .574    | .148    | 86.1                          | 94.2                                          | 79.7 | 14.5  |
| 14    | .705                                            | .766                                      | .643    | .123    | 86.0                          | 93.5                                          | 78.8 | 14.7  |
| 15    | .690                                            | .738                                      | .649    | .089    | 82.8                          | 92.8                                          | 78.8 | 14.0  |
| 16    | .668                                            | .732                                      | .575    | .157    | 86.0                          | 95.4                                          | 78.9 | 16.5  |
| 17    | .640                                            | .699                                      | .564    | .135    | 86.6                          | 95.8                                          | 79.0 | 16.8  |
| 18    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 19    | .692                                            | .746                                      | .622    | .124    | 86.0                          | 94.8                                          | 78.5 | 16.3  |
| 20    | .685                                            | .747                                      | .608    | .139    | 83.2                          | 94.2                                          | 75.6 | 18.6  |
| 21    | .686                                            | .770                                      | .626    | .144    | 82.4                          | 89.2                                          | 76.2 | 13.0  |
| 22    | .672                                            | .752                                      | .611    | .141    | 85.8                          | 95.4                                          | 77.4 | 18.0  |
| 23    | .736                                            | .809                                      | .669    | .140    | 87.7                          | 94.4                                          | 82.2 | 12.2  |
| 24    | .749                                            | .811                                      | .675    | .136    | 87.4                          | 93.4                                          | 82.4 | 11.0  |
| 25    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 26    | .638                                            | .694                                      | .574    | .120    | 87.8                          | 99.9                                          | 80.0 | 19.9  |
| 27    | .608                                            | .684                                      | .531    | .153    | 89.5                          | 101.8                                         | 81.0 | 20.8  |
| 28    | .567                                            | .628                                      | .483    | .145    | 91.5                          | 103.2                                         | 83.5 | 19.7  |
| 29    | .558                                            | .629                                      | .474    | .155    | 91.6                          | 102.8                                         | 84.6 | 18.2  |
| 30    | .565                                            | .650                                      | .496    | .154    | 90.1                          | 99.8                                          | 84.6 | 15.2  |
| 31    | .582                                            | .630                                      | .533    | .097    | 90.2                          | 97.8                                          | 84.8 | 13.0  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1862.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | 75.5                            | 5.2                 | 72.9                | 7.8                          | 0.797                            | 8.59                                             | 2.45                                                                    | 0.78                                                              |
| 2     | 78.4                            | 6.3                 | 75.2                | 9.5                          | .860                             | 9.18                                             | 3.24                                                                    | .74                                                               |
| 3     | 77.6                            | 5.5                 | 74.8                | 8.3                          | .849                             | .11                                              | 2.75                                                                    | .77                                                               |
| 4     | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 5     | 78.3                            | 5.1                 | 75.7                | 7.7                          | .873                             | .36                                              | .60                                                                     | .78                                                               |
| 6     | 73.3                            | 3.7                 | 71.4                | 5.6                          | .761                             | 8.25                                             | 1.64                                                                    | .83                                                               |
| 7     | 76.8                            | 5.4                 | 74.1                | 8.1                          | .830                             | .92                                              | 2.62                                                                    | .77                                                               |
| 8     | 75.3                            | 6.5                 | 72.0                | 9.8                          | .776                             | .33                                              | 3.07                                                                    | .73                                                               |
| 9     | 78.2                            | 6.8                 | 74.8                | 10.2                         | .849                             | 9.07                                             | .46                                                                     | .72                                                               |
| 10    | 78.4                            | 6.1                 | 75.3                | 9.2                          | .862                             | .23                                              | .12                                                                     | .75                                                               |
| 11    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 12    | 76.4                            | 6.9                 | 72.9                | 10.4                         | .797                             | 8.56                                             | .37                                                                     | .72                                                               |
| 13    | 79.1                            | 7.0                 | 75.6                | 10.5                         | .871                             | 9.27                                             | .68                                                                     | .72                                                               |
| 14    | 79.7                            | 6.3                 | 76.5                | 9.5                          | .896                             | .56                                              | .35                                                                     | .74                                                               |
| 15    | 77.6                            | 5.2                 | 75.0                | 7.8                          | .854                             | .16                                              | 2.59                                                                    | .78                                                               |
| 16    | 79.6                            | 6.4                 | 76.4                | 9.6                          | .893                             | .53                                              | 3.38                                                                    | .74                                                               |
| 17    | 79.8                            | 6.8                 | 76.4                | 10.2                         | .893                             | .53                                              | .61                                                                     | .73                                                               |
| 18    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 19    | 79.4                            | 6.6                 | 76.1                | 9.9                          | .885                             | .44                                              | .47                                                                     | .73                                                               |
| 20    | 77.6                            | 5.6                 | 74.8                | 8.4                          | .849                             | .11                                              | 2.78                                                                    | .77                                                               |
| 21    | 76.2                            | 6.2                 | 73.1                | 9.3                          | .803                             | 8.63                                             | .98                                                                     | .74                                                               |
| 22    | 79.3                            | 6.5                 | 76.0                | 9.8                          | .882                             | 9.41                                             | 3.42                                                                    | .73                                                               |
| 23    | 81.4                            | 6.3                 | 78.2                | 9.5                          | .946                             | 10.05                                            | .51                                                                     | .74                                                               |
| 24    | 81.4                            | 6.0                 | 78.4                | 9.0                          | .952                             | .12                                              | .33                                                                     | .75                                                               |
| 25    | Sunday.                         |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 26    | 80.6                            | 7.2                 | 77.0                | 10.8                         | .910                             | 9.67                                             | .93                                                                     | .71                                                               |
| 27    | 81.1                            | 8.4                 | 76.9                | 12.6                         | .908                             | .60                                              | 4.69                                                                    | .67                                                               |
| 28    | 82.5                            | 9.0                 | 78.0                | 13.5                         | .940                             | .90                                              | 5.25                                                                    | .65                                                               |
| 29    | 83.4                            | 8.2                 | 79.3                | 12.3                         | .979                             | 10.34                                            | 4.85                                                                    | .68                                                               |
| 30    | 83.0                            | 7.1                 | 79.4                | 10.7                         | .983                             | .39                                              | .15                                                                     | .72                                                               |
| 31    | 83.7                            | 6.5                 | 80.4                | 9.8                          | 1.014                            | .72                                              | 3.87                                                                    | .74                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.686                                          | 29.815                                                       | 29.550  | 0.265   | 81.0                          | 86.8                                                                | 73.3 | 13.5  |
| 1              | .680                                            | .806                                                         | .543    | .263    | 80.5                          | 86.4                                                                | 74.4 | 12.0  |
| 2              | .669                                            | .803                                                         | .531    | .272    | 80.3                          | 86.2                                                                | 74.0 | 12.2  |
| 3              | .659                                            | .800                                                         | .519    | .281    | 80.2                          | 86.0                                                                | 73.2 | 12.8  |
| 4              | .667                                            | .820                                                         | .520    | .300    | 79.5                          | 85.3                                                                | 72.3 | 13.0  |
| 5              | .674                                            | .766                                                         | .558    | .208    | 79.6                          | 84.8                                                                | 73.6 | 11.2  |
| 6              | .696                                            | .845                                                         | .582    | .263    | 79.6                          | 84.8                                                                | 72.4 | 12.4  |
| 7              | .717                                            | .876                                                         | .591    | .285    | 80.8                          | 86.6                                                                | 72.2 | 14.4  |
| 8              | .745                                            | .910                                                         | .614    | .296    | 83.2                          | 90.0                                                                | 72.6 | 17.4  |
| 9              | .746                                            | .897                                                         | .620    | .277    | 86.3                          | 91.6                                                                | 73.0 | 18.6  |
| 10             | .748                                            | .919                                                         | .620    | .299    | 88.5                          | 94.6                                                                | 76.0 | 18.6  |
| 11             | .734                                            | .899                                                         | .595    | .304    | 90.6                          | 97.6                                                                | 75.6 | 22.0  |
| Noon.          | .718                                            | .841                                                         | .580    | .261    | 91.7                          | 100.2                                                               | 76.8 | 23.4  |
| 1              | .695                                            | .835                                                         | .555    | .280    | 92.8                          | 102.0                                                               | 80.8 | 21.2  |
| 2              | .665                                            | .820                                                         | .532    | .288    | 93.0                          | 102.7                                                               | 83.2 | 19.5  |
| 3              | .642                                            | .798                                                         | .511    | .287    | 93.2                          | 103.2                                                               | 82.6 | 20.6  |
| 4              | .624                                            | .774                                                         | .485    | .289    | 92.1                          | 103.0                                                               | 82.4 | 20.6  |
| 5              | .620                                            | .761                                                         | .474    | .287    | 90.2                          | 99.8                                                                | 81.9 | 17.9  |
| 6              | .626                                            | .750                                                         | .490    | .260    | 88.1                          | 96.7                                                                | 80.0 | 16.7  |
| 7              | .649                                            | .761                                                         | .512    | .249    | 85.4                          | 92.6                                                                | 79.2 | 13.4  |
| 8              | .672                                            | .801                                                         | .526    | .275    | 84.1                          | 90.0                                                                | 76.2 | 13.8  |
| 9              | .686                                            | .794                                                         | .555    | .239    | 83.1                          | 89.0                                                                | 74.4 | 14.6  |
| 10             | .704                                            | .851                                                         | .567    | .284    | 82.4                          | 87.6                                                                | 74.0 | 13.6  |
| 11             | .701                                            | .815                                                         | .571    | .244    | 81.7                          | 87.0                                                                | 73.0 | 14.0  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 77.1                            | 3.9                 | 75.1                | 5.9                          | 0.857                            | 9.23                                                  | 1.91                                                                     | 0.83                                                                 |
| 1              | 76.7                            | 3.8                 | 74.8                | 5.7                          | .849                             | .15                                                   | .83                                                                      | .83                                                                  |
| 2              | 76.6                            | 3.7                 | 74.7                | 5.6                          | .846                             | .12                                                   | .79                                                                      | .84                                                                  |
| 3              | 76.8                            | 3.4                 | 75.1                | 5.1                          | .857                             | .25                                                   | .63                                                                      | .85                                                                  |
| 4              | 76.5                            | 3.0                 | 75.0                | 4.5                          | .854                             | .22                                                   | .44                                                                      | .87                                                                  |
| 5              | 76.9                            | 2.7                 | 75.5                | 4.1                          | .868                             | .38                                                   | .31                                                                      | .88                                                                  |
| 6              | 77.0                            | 2.6                 | 75.7                | 3.9                          | .873                             | .43                                                   | .26                                                                      | .88                                                                  |
| 7              | 77.7                            | 3.1                 | 76.1                | 4.7                          | .885                             | .53                                                   | .54                                                                      | .86                                                                  |
| 8              | 79.1                            | 4.1                 | 77.0                | 6.2                          | .910                             | .77                                                   | 2.12                                                                     | .82                                                                  |
| 9              | 80.4                            | 5.9                 | 77.4                | 8.9                          | .922                             | .83                                                   | 3.19                                                                     | .76                                                                  |
| 10             | 80.9                            | 7.6                 | 77.1                | 11.4                         | .913                             | .70                                                   | 4.18                                                                     | .70                                                                  |
| 11             | 81.3                            | 9.3                 | 76.6                | 14.0                         | .899                             | .50                                                   | 5.26                                                                     | .64                                                                  |
| Noon.          | 81.6                            | 10.1                | 76.5                | 15.2                         | .896                             | .46                                                   | .77                                                                      | .62                                                                  |
| 1              | 81.7                            | 11.1                | 76.1                | 16.7                         | .885                             | .30                                                   | 6.42                                                                     | .59                                                                  |
| 2              | 81.3                            | 11.7                | 75.4                | 17.6                         | .865                             | .09                                                   | .72                                                                      | .58                                                                  |
| 3              | 81.4                            | 11.8                | 75.5                | 17.7                         | .868                             | .12                                                   | .78                                                                      | .57                                                                  |
| 4              | 80.6                            | 11.5                | 74.8                | 17.3                         | .849                             | 8.95                                                  | .46                                                                      | .58                                                                  |
| 5              | 80.4                            | 9.8                 | 75.5                | 14.7                         | .868                             | 9.18                                                  | 5.41                                                                     | .63                                                                  |
| 6              | 80.0                            | 8.1                 | 75.9                | 12.2                         | .879                             | .34                                                   | 4.38                                                                     | .68.                                                                 |
| 7              | 79.4                            | 6.0                 | 76.4                | 9.0                          | .893                             | .55                                                   | 3.13                                                                     | .75                                                                  |
| 8              | 78.6                            | 5.5                 | 75.8                | 8.3                          | .876                             | .39                                                   | 2.82                                                                     | .77                                                                  |
| 9              | 78.0                            | 5.1                 | 75.4                | 7.7                          | .865                             | .28                                                   | .58                                                                      | .78                                                                  |
| 10             | 78.0                            | 4.4                 | 75.8                | 6.6                          | .876                             | .41                                                   | .20                                                                      | .81                                                                  |
| 11             | 77.8                            | 3.9                 | 75.8                | 5.9                          | .876                             | .43                                                   | 1.94                                                                     | .83                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                   |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 1     | 116.6                 | ...                             | S.                                | Cloudy till 9 A. M. Scatd. ∩i & ∪i. till 6 P. M. cloudy afterwards; also slightly drizzling at 5 A. M. & between 8 & 9 P. M. |
| 2     | 127.0                 | ...                             | S. & S. E.                        | Cloudless till 7 A. M. Scatd. clouds till 7 P. M. cloudless afterwards.                                                      |
| 3     | 131.3                 | 0.56                            | S. & S. W.                        | Cloudless till 4 A. M. Scatd. ∪i & ∩i till 6 P. M. cloudy afterwards; also raining between 9 & 11 P. M.                      |
| 4     | <i>Sunday.</i>        |                                 |                                   |                                                                                                                              |
| 5     | 130.0                 | 0.96                            | S. & S. E.                        | Cloudless till 6 A. M. Scatd. ∩i till 6 P. M. cloudy afterwards; also raining at 10 P. M.                                    |
| 6     | ...                   | 1.26                            | S. & N. W.                        | Cloudy till 5 P. M. Scatd. ∩i afterwards; also raining at 3 & 4 & between 6 & 7 A. M.                                        |
| 7     | 132.5                 | ...                             | S. & S. E.                        | Cloudless till 7 A. M. Scatd. ∪i till 6 P. M. cloudless afterwards.                                                          |
| 8     | 130.7                 | ...                             | S.                                | Scatd. clouds.                                                                                                               |
| 9     | 135.0                 | ...                             | S. & S. W.                        | Cloudless till 5 A. M. Scatd. ∩i & ∪i afterwards; also slightly drizzling between 6 & 7 P. M.                                |
| 10    | 123.5                 | ...                             | S.                                | Cloudless till 10 A. M. Scatd. ∪i & ∩i afterwards.                                                                           |
| 11    | <i>Sunday.</i>        | 0.60                            |                                   |                                                                                                                              |
| 12    | 135.5                 | ...                             | S. E. & S. & S. W.                | Cloudless till 8 A. M. Scatd. ∪i till 5 P. M. cloudless afterwards.                                                          |
| 13    | 136.5                 | ...                             | S.                                | Cloudless till 10 A. M. Scatd. ∪i till 6 P. M.; cloudy afterwards.                                                           |
| 14    | 127.0                 | ...                             | S. & S. E.                        | Cloudless till 8 A. M. Scatd. ∪i & ∩i afterwards.                                                                            |
| 15    | ...                   | 0.12                            | E. & S. E.                        | Cloudless till 5 A. M. cloudy afterwards; also thunder & lightning between 8 & 11 P. M. & raining at Noon, 2 & 9 P. M.       |
| 16    | 134.0                 | ...                             | S. & S. E.                        | Scatd. ∩i & ∪i.                                                                                                              |
| 17    | 133.0                 | ...                             | S. & E.                           | Cloudless till 8 A. M. Scatd. ∩i & ∪i till 7 P. M. cloudless afterwards.                                                     |
| 18    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                              |
| 19    | 130.5                 | ...                             | S. E. & S.                        | Scatd. ∩i till 8 A. M. Scatd. ∪i till 6 P. M. cloudy afterwards; also slightly drizzling between 7 & 8 P. M.                 |

∩i Cirri, ∩i Cirro strati, ∪i Cumuli, ∩i Cumulo strati, ∩i Nimbi, —i Strati, ∩i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                               |
|-------|-----------------------|---------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 20    | 135.0                 | ...                             | E. & S.                           | Cloudless till 6 A. M. Scatd. $\searrow$ i & $\nearrow$ i till 3 P. M. cloudy afterwards; also very slightly raining between 8 & 9 P. M. |
| 21    | 126.4                 | ...                             | E. & N. E.                        | Cloudy till 7 A. M. Scatd. $\searrow$ i till 2 P. M. cloudless afterwards.                                                               |
| 22    | 136.0                 | ...                             | S. & S. W.                        | Cloudy till 5 A. M. Scatd. $\nearrow$ i till 5 P. M. cloudless afterwards.                                                               |
| 23    | 133.0                 | ...                             | S. W.                             | Cloudless till 5 A. M. Scatd. $\nearrow$ i & $\searrow$ i afterwards.                                                                    |
| 24    | 128.5                 |                                 | S. & E.                           | Cloudless till 5 A. M. Scatd. $\searrow$ i & $\nearrow$ i till 3 P. M. cloudless afterwards.                                             |
| 25    | <i>Sunday.</i>        |                                 |                                   |                                                                                                                                          |
| 26    | 139.0                 | 0.22                            | S.                                | Cloudless till Noon, cloudy till 8 P. M. cloudless afterwards; also raining between 6 & 7 P. M.                                          |
| 27    | 139.0                 | ...                             | S. & E.                           | Cloudless.                                                                                                                               |
| 28    | 139.3                 | ...                             | S.                                | Cloudless.                                                                                                                               |
| 29    | 142.0                 | ...                             | S. & calm.                        | Cloudless till Noon, Scatd. $\searrow$ i & $\nearrow$ i till 7 P. M. cloudless afterwards.                                               |
| 30    | 139.0                 | 0.08                            | S. & S. E.                        | Cloudless till 2 P. M. Scatd. clouds till 7 P. M. cloudless afterwards; also raining between 4 & 5 P. M.                                 |
| 31    | 130.0                 | ...                             | S & S. W.                         | Cloudless till 4 A. M. Scatd. $\searrow$ i till 4 P. M. cloudy afterwards.                                                               |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1862.*

MONTHLY RESULTS.

|                                                               |    |    | Inches |
|---------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                   | .. | .. | 29.684 |
| Max. height of the Barometer occurred at 10 A. M. on the 6th, | .. | .. | 29.919 |
| Min. height of the Barometer occurred at 5 P. M. on the 29th, | .. | .. | 29.474 |
| <i>Extreme range</i> of the Barometer during the month,       | .. | .. | 0.445  |
| Mean of the daily Max. Pressures,                             | .. | .. | 29.754 |
| Ditto ditto Min. ditto,                                       | .. | .. | 29.614 |
| <i>Mean daily range</i> of the Barometer during the month,    | .. | .. | 0.140  |

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|                                                              |    |    | °     |
|--------------------------------------------------------------|----|----|-------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 85.4  |
| Max. Temperature occurred at 3 P. M. on the 28th,            | .. | .. | 103.2 |
| Min. Temperature occurred at 7 A. M. on the 6th,             | .. | .. | 72.2  |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 31 0  |
| Mean of the daily Max. Temperature,                          | .. | .. | 94.1  |
| Ditto ditto Min. ditto,                                      | .. | .. | 78.5  |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 15.6  |

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|                                                            |    |    | °      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 79.0   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 6.4    |
| Computed Mean Dew-point for the month,                     | .. | .. | 75.8   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 9.6    |
|                                                            |    |    | Inches |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.876  |

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|                                                                         |    |    | Troy grains. |
|-------------------------------------------------------------------------|----|----|--------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 9.35         |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 3.33         |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.74         |

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|                                                    |    |    | Inches |
|----------------------------------------------------|----|----|--------|
| Rained 11 days, Max. fall of rain during 24 hours, | .. | .. | 1.26   |
| Total amount of rain during the month,             | .. | .. | 3.80   |
| Prevailing direction of the Wind,                  | .. | .. | S.     |

Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of May, 1862.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N. | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E.        | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|----|----------|-------|----------|----|----------|--------------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           |    |          |       |          |    |          | No. of days. |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. |    |          | 1     |          | 5  |          | 4            |          | 11 |          | 2     |          |    |          | 1     |          |       |          | 3       |
| 1         |    |          | 1     |          | 5  |          | 4            |          | 13 |          | 1     |          | 1  |          | 1     |          | 1     |          |         |
| 2         |    |          | 1     |          | 5  |          | 6            |          | 11 |          | 1     |          | 1  |          | 1     |          | 1     |          |         |
| 3         |    |          | 1     |          | 6  |          | 6            |          | 11 |          |       |          |    |          | 1     | 1        | 1     |          | 1       |
| 4         |    |          | 1     |          | 5  |          | 7            |          | 9  |          |       |          |    |          | 1     | 1        |       |          | 4       |
| 5         | 1  |          | 2     |          | 6  | 1        | 6            |          | 10 |          |       |          |    |          |       |          | 1     |          | 1       |
| 6         | 1  |          | 4     |          | 5  |          | 5            |          | 10 |          |       |          |    |          | 1     |          | 1     |          |         |
| 7         | 1  |          | 3     |          | 4  |          | 7            |          | 11 |          |       |          |    |          | 1     | 1        |       |          |         |
| 8         |    |          |       |          | 5  |          | 7            |          | 10 |          | 1     |          |    |          |       |          |       |          | 4       |
| 9         |    |          |       |          | 4  |          | 3            |          | 20 |          |       |          |    |          |       |          |       |          |         |
| 10        |    |          |       |          | 3  |          | 3            |          | 18 |          | 3     |          |    |          |       |          |       |          |         |
| 11        |    |          |       |          | 2  |          | 2            |          | 19 |          | 3     |          |    |          | 1     |          |       |          |         |
| Noon.     | 1  |          |       |          | 2  | 1        | 3            |          | 14 |          | 6     |          |    |          | 1     |          |       |          |         |
| 1         | 1  |          |       |          |    |          | 3            |          | 13 |          | 7     |          | 2  |          | 1     |          |       |          |         |
| 2         |    |          | 2     | 1        |    |          | 1            |          | 12 |          | 6     |          | 3  |          | 3     |          |       |          |         |
| 3         |    |          | 1     |          | 1  |          |              |          | 16 |          | 7     |          |    |          | 2     |          |       |          |         |
| 4         | 1  |          |       |          | 3  |          | 3            |          | 10 |          | 8     |          | 1  |          | 1     |          |       |          |         |
| 5         |    |          |       |          | 2  |          | 3            |          | 14 | 1        | 4     |          | 1  |          |       |          |       |          | 3       |
| 6         |    |          |       |          | 4  |          | 3            |          | 14 |          | 5     |          |    |          |       |          |       |          | 1       |
| 7         |    |          |       |          | 5  |          | 2            |          | 17 | 2        | 2     |          |    |          |       |          |       |          | 1       |
| 8         |    |          |       |          | 5  | 1        | 2            |          | 15 |          | 2     |          |    |          | 1     |          |       |          | 2       |
| 9         |    |          |       |          | 4  | 2        | 1            |          | 15 | 1        | 3     |          |    |          | 1     | 1        |       |          | 3       |
| 10        |    |          |       |          | 3  |          | 2            | 1        | 15 |          | 4     |          |    |          | 1     | 1        | 1     |          | 1       |
| 11        |    |          |       |          | 3  |          | 2            |          | 15 |          | 4     |          |    |          | 1     | 1        | 1     |          | 1       |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1862.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 2     | 29.638                                          | 29.731                                    | 29.542  | 0.189   | 86.1                          | 95.0                                          | 77.6 | 17.4  |
| 3     | .641                                            | .709                                      | .565    | .144    | 84.4                          | 92.6                                          | 77.4 | 15.2  |
| 4     | .549                                            | .610                                      | .425    | .185    | 88.2                          | 96.0                                          | 81.0 | 15.0  |
| 5     | .510                                            | .567                                      | .420    | .147    | 85.6                          | 93.2                                          | 75.6 | 17.6  |
| 6     | .568                                            | .635                                      | .461    | .174    | 84.1                          | 90.8                                          | 77.2 | 13.6  |
| 7     | .625                                            | .687                                      | .551    | .136    | 85.7                          | 91.6                                          | 80.2 | 11.4  |
| 8     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 9     | .658                                            | .733                                      | .572    | .161    | 84.7                          | 91.6                                          | 78.3 | 13.3  |
| 10    | .563                                            | .628                                      | .465    | .163    | 88.6                          | 96.2                                          | 81.2 | 15.0  |
| 11    | .559                                            | .612                                      | .504    | .108    | 87.2                          | 95.4                                          | 82.2 | 13.2  |
| 12    | .604                                            | .652                                      | .524    | .128    | 81.4                          | 83.2                                          | 77.4 | 5.8   |
| 13    | .632                                            | .699                                      | .563    | .136    | 82.5                          | 90.3                                          | 78.0 | 12.3  |
| 14    | .625                                            | .686                                      | .549    | .137    | 83.3                          | 90.2                                          | 77.0 | 13.2  |
| 15    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 16    | .511                                            | .566                                      | .439    | .127    | 82.7                          | 89.2                                          | 79.8 | 9.4   |
| 17    | .444                                            | .482                                      | .390    | .092    | 81.2                          | 83.8                                          | 79.2 | 4.6   |
| 18    | .504                                            | .604                                      | .435    | .169    | 80.1                          | 83.4                                          | 75.6 | 7.8   |
| 19    | .602                                            | .645                                      | .561    | .084    | 80.8                          | 85.8                                          | 75.2 | 10.6  |
| 20    | .624                                            | .682                                      | .564    | .118    | 85.3                          | 91.7                                          | 80.6 | 11.1  |
| 21    | .594                                            | .647                                      | .542    | .105    | 85.5                          | 90.8                                          | 81.8 | 9.0   |
| 22    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 23    | .519                                            | .587                                      | .444    | .143    | 86.5                          | 92.0                                          | 82.7 | 9.3   |
| 24    | .541                                            | .587                                      | .466    | .121    | 86.5                          | 91.4                                          | 83.0 | 8.4   |
| 25    | .511                                            | .582                                      | .421    | .161    | 84.1                          | 90.6                                          | 76.4 | 14.2  |
| 26    | .438                                            | .494                                      | .389    | .105    | 85.8                          | 90.6                                          | 80.4 | 10.2  |
| 27    | .416                                            | .469                                      | .369    | .100    | 85.2                          | 91.9                                          | 81.0 | 10.9  |
| 28    | .402                                            | .461                                      | .322    | .139    | 86.1                          | 92.4                                          | 82.0 | 10.4  |
| 29    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 30    | .465                                            | .579                                      | .391    | .188    | 81.6                          | 83.8                                          | 80.4 | 3.4   |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the twenty-four hourly Observations made during the day.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1862.*

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a Cubic foot of air. | Additional Weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humidity,<br>complete saturation be-<br>ing unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                   |
| 1     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 2     | 80.0                            | 6.1                 | 76.9                | 9.2                          | 0.908                            | 9.68                                             | 3.27                                                                    | 0.75                                                              |
| 3     | 80.1                            | 4.3                 | 77.9                | 6.5                          | .937                             | 10.02                                            | 2.29                                                                    | .81                                                               |
| 4     | 81.9                            | 6.3                 | 78.7                | 9.5                          | .961                             | .20                                              | 3.56                                                                    | .74                                                               |
| 5     | 80.6                            | 5.0                 | 78.1                | 7.5                          | .943                             | .06                                              | 2.70                                                                    | .79                                                               |
| 6     | 79.0                            | 5.1                 | 76.4                | 7.7                          | .893                             | 9.56                                             | .65                                                                     | .78                                                               |
| 7     | 79.9                            | 5.8                 | 77.0                | 8.7                          | .910                             | .71                                              | 3.09                                                                    | .76                                                               |
| 8     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 9     | 78.4                            | 6.3                 | 75.2                | 9.5                          | .860                             | .18                                              | .24                                                                     | .74                                                               |
| 10    | 80.6                            | 8.0                 | 76.6                | 12.0                         | .899                             | .54                                              | 4.38                                                                    | .69                                                               |
| 11    | 80.9                            | 6.3                 | 77.7                | 9.5                          | .931                             | .90                                              | 3.47                                                                    | .74                                                               |
| 12    | 78.5                            | 2.9                 | 77.0                | 4.4                          | .910                             | .81                                              | 1.46                                                                    | .87                                                               |
| 13    | 78.9                            | 3.6                 | 77.1                | 5.4                          | .913                             | .82                                              | .82                                                                     | .84                                                               |
| 14    | 79.1                            | 4.2                 | 77.0                | 6.3                          | .910                             | .77                                              | 2.16                                                                    | .82                                                               |
| 15    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 16    | 79.4                            | 3.3                 | 77.7                | 5.0                          | .931                             | 10.00                                            | 1.72                                                                    | .85                                                               |
| 17    | 78.8                            | 2.4                 | 77.6                | 3.6                          | .928                             | 9.99                                             | .22                                                                     | .89                                                               |
| 18    | 77.7                            | 2.4                 | 76.5                | 3.6                          | .896                             | .67                                              | .17                                                                     | .89                                                               |
| 19    | 78.5                            | 2.3                 | 77.3                | 3.5                          | .919                             | .90                                              | .17                                                                     | .89                                                               |
| 20    | 80.9                            | 4.4                 | 78.7                | 6.6                          | .961                             | 10.26                                            | 2.38                                                                    | .81                                                               |
| 21    | 81.2                            | 4.3                 | 79.0                | 6.5                          | .970                             | .35                                              | .37                                                                     | .81                                                               |
| 22    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 23    | 82.4                            | 4.1                 | 80.3                | 6.2                          | 1.011                            | .78                                              | .32                                                                     | .82                                                               |
| 24    | 82.4                            | 4.1                 | 80.3                | 6.2                          | .011                             | .78                                              | .32                                                                     | .82                                                               |
| 25    | 80.0                            | 4.1                 | 77.9                | 6.2                          | 0.937                            | .04                                              | .17                                                                     | .82                                                               |
| 26    | 80.8                            | 5.0                 | 78.3                | 7.5                          | .949                             | .12                                              | .71                                                                     | .79                                                               |
| 27    | 81.2                            | 4.0                 | 79.2                | 6.0                          | .976                             | .43                                              | .18                                                                     | .83                                                               |
| 28    | 81.7                            | 4.4                 | 79.5                | 6.6                          | .986                             | .51                                              | .44                                                                     | .81                                                               |
| 29    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                   |
| 30    | 79.2                            | 2.4                 | 78.0                | 3.6                          | .940                             | .11                                              | 1.23                                                                    | .89                                                               |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of<br>the Barometer<br>at 32° Faht. | Range of the Barometer for<br>each hour during the<br>month. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture for each hour<br>during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|-------------------------------|---------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                               | Max.                                                                | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                             | o                                                                   | o    | o     |
| Mid-<br>night. | 29.563                                          | 29.704                                                       | 29.407  | 0.297   | 81.9                          | 85.4                                                                | 76.6 | 8.8   |
| 1              | .555                                            | .681                                                         | .405    | .276    | 81.7                          | 84.8                                                                | 76.7 | 8.1   |
| 2              | .543                                            | .677                                                         | .403    | .274    | 81.2                          | 84.2                                                                | 76.4 | 7.8   |
| 3              | .534                                            | .675                                                         | .398    | .277    | 81.0                          | 83.8                                                                | 77.7 | 6.1   |
| 4              | .534                                            | .667                                                         | .389    | .278    | 80.5                          | 83.0                                                                | 75.2 | 7.8   |
| 5              | .545                                            | .674                                                         | .394    | .280    | 80.2                          | 83.2                                                                | 75.4 | 7.8   |
| 6              | .563                                            | .705                                                         | .410    | .295    | 80.4                          | 83.6                                                                | 75.6 | 8.0   |
| 7              | .577                                            | .714                                                         | .419    | .295    | 81.3                          | 84.6                                                                | 76.4 | 8.2   |
| 8              | .588                                            | .728                                                         | .442    | .286    | 83.4                          | 87.8                                                                | 77.0 | 10.8  |
| 9              | .597                                            | .733                                                         | .453    | .280    | 85.2                          | 89.0                                                                | 81.6 | 7.4   |
| 10             | .595                                            | .720                                                         | .453    | .267    | 86.5                          | 91.4                                                                | 81.2 | 10.2  |
| 11             | .585                                            | .707                                                         | .444    | .263    | 88.0                          | 93.4                                                                | 77.4 | 16.0  |
| Noon.          | .570                                            | .682                                                         | .420    | .262    | 88.5                          | 95.5                                                                | 77.8 | 17.7  |
| 1              | .549                                            | .664                                                         | .386    | .278    | 89.3                          | 96.0                                                                | 79.2 | 16.8  |
| 2              | .527                                            | .634                                                         | .365    | .269    | 89.7                          | 95.8                                                                | 80.4 | 15.4  |
| 3              | .507                                            | .609                                                         | .338    | .271    | 89.0                          | 95.8                                                                | 81.3 | 14.5  |
| 4              | .488                                            | .585                                                         | .325    | .260    | 88.6                          | 96.2                                                                | 81.0 | 15.2  |
| 5              | .491                                            | .583                                                         | .322    | .261    | 87.3                          | 96.0                                                                | 79.2 | 16.8  |
| 6              | .504                                            | .591                                                         | .341    | .250    | 86.5                          | 94.4                                                                | 80.6 | 13.8  |
| 7              | .525                                            | .644                                                         | .366    | .278    | 85.3                          | 92.4                                                                | 80.0 | 12.4  |
| 8              | .548                                            | .660                                                         | .386    | .274    | 84.0                          | 90.4                                                                | 77.9 | 12.5  |
| 9              | .563                                            | .677                                                         | .402    | .275    | 83.0                          | 88.2                                                                | 75.6 | 12.6  |
| 10             | .576                                            | .717                                                         | .404    | .313    | 82.4                          | 86.8                                                                | 75.6 | 11.2  |
| 11             | .573                                            | .731                                                         | .391    | .340    | 82.2                          | 86.4                                                                | 76.2 | 10.2  |

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers, are derived from the Observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1862.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force<br>of Vapour. | Mean Weight of Va-<br>pour in a Cubic<br>foot of air. | Additional Weight of<br>Vapour required<br>for complete satu-<br>ration. | Mean degree of Hu-<br>midity, complete<br>saturation being<br>unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | Troy grs.                                             | Troy grs.                                                                |                                                                      |
| Mid-<br>night. | 79.2                            | 2.7                 | 77.8                | 4.1                          | 0.934                            | 10.05                                                 | 1.39                                                                     | 0.88                                                                 |
| 1              | 79.2                            | 2.5                 | 77.9                | 3.8                          | .937                             | .08                                                   | .29                                                                      | .89                                                                  |
| 2              | 78.8                            | 2.4                 | 77.6                | 3.6                          | .928                             | 9.99                                                  | .22                                                                      | .89                                                                  |
| 3              | 78.6                            | 2.4                 | 77.4                | 3.6                          | .922                             | .93                                                   | .21                                                                      | .89                                                                  |
| 4              | 78.3                            | 2.2                 | 77.2                | 3.3                          | .916                             | .89                                                   | .09                                                                      | .90                                                                  |
| 5              | 78.1                            | 2.1                 | 77.0                | 3.2                          | .910                             | .83                                                   | .05                                                                      | .90                                                                  |
| 6              | 78.1                            | 2.3                 | 76.9                | 3.5                          | .908                             | .78                                                   | .16                                                                      | .89                                                                  |
| 7              | 78.6                            | 2.7                 | 77.2                | 4.1                          | .916                             | .87                                                   | .37                                                                      | .88                                                                  |
| 8              | 79.6                            | 3.8                 | 77.7                | 5.7                          | .931                             | .98                                                   | .98                                                                      | .83                                                                  |
| 9              | 80.4                            | 4.8                 | 78.0                | 7.2                          | .940                             | 10.05                                                 | 2.56                                                                     | .80                                                                  |
| 10             | 80.9                            | 5.6                 | 78.1                | 8.4                          | .943                             | .06                                                   | 3.04                                                                     | .77                                                                  |
| 11             | 81.5                            | 6.5                 | 78.2                | 9.8                          | .946                             | .05                                                   | .63                                                                      | .74                                                                  |
|                |                                 |                     |                     |                              |                                  |                                                       |                                                                          |                                                                      |
| Noon.          | 81.6                            | 6.9                 | 78.1                | 10.4                         | .943                             | .02                                                   | .86                                                                      | .72                                                                  |
| 1              | 82.2                            | 7.1                 | 78.6                | 10.7                         | .958                             | .15                                                   | 4.06                                                                     | .71                                                                  |
| 2              | 82.4                            | 7.3                 | 78.7                | 11.0                         | .961                             | .18                                                   | .19                                                                      | .71                                                                  |
| 3              | 82.0                            | 7.0                 | 78.5                | 10.5                         | .955                             | .12                                                   | 3.96                                                                     | .72                                                                  |
| 4              | 81.6                            | 7.0                 | 78.1                | 10.5                         | .943                             | .00                                                   | .92                                                                      | .72                                                                  |
| 5              | 81.4                            | 5.9                 | 78.4                | 8.9                          | .952                             | .12                                                   | .29                                                                      | .76                                                                  |
| 6              | 81.1                            | 5.4                 | 78.4                | 8.1                          | .952                             | .15                                                   | 2.95                                                                     | .78                                                                  |
| 7              | 80.6                            | 4.7                 | 78.2                | 7.1                          | .946                             | .11                                                   | .53                                                                      | .80                                                                  |
| 8              | 79.8                            | 4.2                 | 77.7                | 6.3                          | .931                             | 9.98                                                  | .19                                                                      | .82                                                                  |
| 9              | 79.4                            | 3.6                 | 77.6                | 5.4                          | .928                             | .97                                                   | 1.85                                                                     | .84                                                                  |
| 10             | 79.1                            | 3.3                 | 77.4                | 5.0                          | .922                             | .91                                                   | .70                                                                      | .85                                                                  |
| 11             | 78.9                            | 3.3                 | 77.2                | 5.0                          | .916                             | .85                                                   | .69                                                                      | .85                                                                  |

All the Hygrometrical elements are computed by the Greenwich Constants.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                                                                             |
|-------|-----------------------|---------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | o                     | Inches                          |                                   |                                                                                                                                                        |
| 2     | 128.0                 | 0.09                            | <i>Sunday.</i><br>S. & S. E. & N. | Cloudy : also raining between 3 & 4 A. M. and incessantly raining between 7 & 11 P. M.                                                                 |
| 3     | 131.0                 | 2.44                            | S. & S. W. & E.                   | Cloudy till 8 A. M. Scatd. ∩i & ∪i till 5 P. M. cloudless afterwards also raining between Midnight & 2 A. M.                                           |
| 4     | 131.0                 | 0.17                            | S. & S. W.                        | Cloudy till 8 A. M. cloudless till 4 P. M. cloudy afterwards : also raining with thunder and lightning between 8 & 9 P. M.                             |
| 5     | 128.0                 | 0.08                            | S. & S. E.                        | Cloudy till 7 A. M. Scatd. ∪i & ∩i till 6 P. M. cloudy afterwards : also drizzling at 8, 9 & 11 P. M. also thunders and lightning between 9 & 10 P. M. |
| 6     | 125.0                 | 0.28                            | S. E. & E.                        | Cloudy till 7 A. M. Scatd. clouds afterwards : also raining at Midnight & 1 A. M.                                                                      |
| 7     | 119.0                 | ...                             | N. E. & S.                        | Scatd. clouds till 11 A. M. cloudy afterwards, also slightly drizzling at 6 P. M.                                                                      |
| 8     | ...                   | ...                             | <i>Sunday.</i>                    |                                                                                                                                                        |
| 9     | 122.5                 | ...                             | S. E. & Calm.                     | Cloudless till 7 A. M. Scatd. clouds till 6 P. M. cloudless afterwards : also slightly drizzling at 1 P. M.                                            |
| 10    | 136.5                 | ...                             | N. W. & Calm.                     | Cloudless till 8 A. M. Scatd. ∪i till 4 P. M. cloudless afterwards.                                                                                    |
| 11    | 132.8                 | ...                             | S. E. & S.                        | Cloudless till 6 A. M. Scatd. ∩i & ∪i till 8 P. M. cloudless afterwards.                                                                               |
| 12    | ...                   | 0.48                            | N. E. & S.                        | Cloudless till 4 A. M. cloudy afterwards ; also raining at 11 A. M. & Noon.                                                                            |
| 13    | 119.0                 | 0.18                            | S. & S. E.                        | Scatd. clouds : also thunder and rain at 3 P. M.                                                                                                       |
| 14    | ...                   | ...                             | S. & S. E.                        | Cloudy ; also slightly drizzling at 4 & 5 A. M.                                                                                                        |
| 15    | ...                   | 0.97                            | <i>Sunday.</i>                    |                                                                                                                                                        |
| 16    | 120.0                 | ...                             | S. E. & N. & W.                   | Cloudy ; also slightly drizzling at 11 P. M.                                                                                                           |
| 17    | ...                   | 0.64                            | W. & S.                           | Cloudy ; also constantly drizzling.                                                                                                                    |
| 18    | ...                   | 0.27                            | S.                                | Cloudy ; also constantly drizzling.                                                                                                                    |
| 19    | ...                   | 4.36                            | S. & S. W.                        | Cloudy ; also raining between Midnight & 4 A. M. & between 11 A. M. & Noon.                                                                            |
| 20    | 129.3                 | ...                             | S.                                | Scatd. ∩i till 2 P. M. cloudy afterwards.                                                                                                              |

∩i Cirri, ∩i Cirro strati, ∪i Cumuli, ∩i Cumulo strati, ∩i Nimbi, —i Strati, ∩i Cirro cumuli.

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taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1862.*

Solar Radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain Gauge 5 feet above Ground. | Prevailing direction of the Wind. | General Aspect of the Sky.                                                                      |
|-------|-----------------------|---------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------------|
| 21    | 119.0                 | ...                             | S.                                | Cloudless till 4 A. M. Scatd. $\searrow$ i & $\nearrow$ i till 9 P. M. cloudless afterwards.    |
| 22    | ...                   | ...                             | <i>Sunday.</i>                    |                                                                                                 |
| 23    | 121.6                 | ...                             | S.                                | Cloudless till 5 A. M. cloudy till 9 A. M. Scatd. clouds afterwards.                            |
| 24    | ...                   | ...                             | S.                                | Cloudy, the whole day.                                                                          |
| 25    | 128.7                 | 1.68                            | S. & S. E.                        | Cloudy : also thundering and lightning between 1 & 5 A. M. and also raining between 1 & 8 A. M. |
| 26    | ...                   | ...                             | S.                                | Scatd. clouds till 7 P. M. cloudless afterwards.                                                |
| 27    | 121.4                 | 0.08                            | S. & Calm.                        | Cloudless till 7 A. M. Scatd. clouds afterwards : also drizzling at 3 & 4 P. M.                 |
| 28    | 120.5                 | 0.15                            | N. E. & Calm.                     | Scatd. clouds also raining between 4 & 5 P. M.                                                  |
| 29    | ...                   | 0.26                            | <i>Sunday.</i>                    |                                                                                                 |
| 30    | ...                   | 0.96                            | S. E. & E.                        | Cloudy with rain at 9 & 10 A. M. and Noon, also drizzling between 5 & 6 P. M.                   |



*Abstract of the Results of the Hourly Meteorological Observations  
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in the month of June, 1862.*

MONTHLY RESULTS.

|                                                               |    |    | Inches |
|---------------------------------------------------------------|----|----|--------|
| Mean height of the Barometer for the month,                   | .. | .. | 29.550 |
| Max. height of the Barometer occurred at 9 A. M. on the 9th,  | .. | .. | 29.733 |
| Min. height of the Barometer occurred at 5 P. M. on the 28th, | .. | .. | 29.322 |
| <i>Extreme range</i> of the Barometer during the month,       | .. | .. | 0.411  |
| Mean of the daily Max. Pressures,                             | .. | .. | 29.613 |
| Ditto ditto Min. ditto,                                       | .. | .. | 29.475 |
| <i>Mean daily range</i> of the Barometer during the month,    | .. | .. | 0.138  |

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|                                                              |    |    | °    |
|--------------------------------------------------------------|----|----|------|
| Mean Dry Bulb Thermometer for the month,                     | .. | .. | 84.5 |
| Max. Temperature occurred at 4 P. M. on the 10th,            | .. | .. | 96.2 |
| Min. Temperature occurred at 4 A. M. on the 19th,            | .. | .. | 75.2 |
| <i>Extreme range</i> of the Temperature during the month,    | .. | .. | 21 0 |
| Mean of the daily Max. Temperature,                          | .. | .. | 90.5 |
| Ditto ditto Min. ditto,                                      | .. | .. | 79.2 |
| <i>Mean daily range</i> of the Temperature during the month, | .. | .. | 11.3 |

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|                                                            |    |    | °      |
|------------------------------------------------------------|----|----|--------|
| Mean Wet Bulb Thermometer for the month,                   | .. | .. | 80.1   |
| Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, | .. | .. | 4.4    |
| Computed Mean Dew-point for the month,                     | .. | .. | 77.9   |
| Mean Dry Bulb Thermometer above computed Mean Dew-point,   | .. | .. | 6.6    |
|                                                            |    |    | Inches |
| Mean Elastic force of Vapour for the month,                | .. | .. | 0.937  |

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|                                                                         |    |    | Troy grains |
|-------------------------------------------------------------------------|----|----|-------------|
| Mean Weight of Vapour for the month,                                    | .. | .. | 10.02       |
| Additional Weight of Vapour required for complete saturation,           | .. | .. | 2.33        |
| Mean degree of humidity for the month, complete saturation being unity, | .. | .. | 0.81        |

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|                                                    |    |    | Inches     |
|----------------------------------------------------|----|----|------------|
| Rained 21 days, Max. fall of rain during 24 hours, | .. | .. | 4.36       |
| Total amount of rain during the month,             | .. | .. | 13.63      |
| Prevailing direction of the Wind,                  | .. | .. | S. & S. E. |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of June, 1862.*

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind  
blew, together with the number of days on which at the same hour,  
when any particular wind was blowing, it rained.

| Hour.     | N.           | Rain on. | N. E. | Rain on. | E. | Rain on. | S. E. | Rain on. | S. | Rain on. | S. W. | Rain on. | W. | Rain on. | N. W. | Rain on. | Calm. | Rain on. | Missed. |
|-----------|--------------|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|----|----------|-------|----------|-------|----------|---------|
|           | No. of days. |          |       |          |    |          |       |          |    |          |       |          |    |          |       |          |       |          |         |
| Midnight. |              |          | 3     |          | 1  | 1        | 1     |          | 13 | 1        |       |          | 2  | 1        |       |          | 4     |          | 1       |
| 1         |              |          | 3     |          | 1  | 1        | 2     |          | 11 | 1        |       |          | 2  | 1        |       |          | 4     |          | 2       |
| 2         |              |          | 2     |          | 2  | 2        | 2     |          | 12 | 1        |       |          | 2  |          |       |          | 4     |          | 1       |
| 3         |              |          | 2     |          | 1  |          | 3     |          | 11 | 2        | 2     |          | 2  |          |       |          | 2     |          | 2       |
| 4         | 1            |          | 1     |          | 2  |          | 4     | 1        | 9  | 1        | 2     | 1        | 1  |          |       |          | 1     |          | 4       |
| 5         | 1            |          | 1     |          | 1  |          | 5     |          | 12 | 2        | 2     | 1        | 1  | 1        | 1     |          | 1     |          |         |
| 6         | 1            |          | 2     |          | 2  |          | 4     |          | 11 | 1        | 2     |          | 1  |          | 1     |          | 1     |          |         |
| 7         | 2            |          | 2     |          | 3  |          | 3     |          | 11 | 1        | 2     |          | 2  |          |       |          | 1     |          |         |
| 8         | 2            |          | 2     |          | 2  |          | 3     |          | 7  | 1        | 3     |          |    |          | 1     |          |       | 5        |         |
| 9         | 1            |          | 3     |          | 1  |          | 3     | 1        | 11 |          | 3     |          | 1  |          | 1     |          | 1     |          |         |
| 10        | 2            |          | 3     |          |    |          | 3     | 1        | 11 |          | 2     |          | 2  |          | 1     |          | 1     |          |         |
| 11        |              |          | 3     | 1        | 3  |          | 1     |          | 11 |          | 2     |          | 2  | 1        | 3     |          |       |          |         |
| Noon.     | 1            |          | 4     | 1        | 2  | 1        | 1     |          | 13 | 2        | 1     |          | 2  |          | 1     |          |       |          |         |
| 1         | 1            |          | 3     |          | 3  | 1        | 2     |          | 12 |          | 2     |          |    |          | 2     |          |       |          |         |
| 2         | 1            |          | 6     |          |    |          | 5     |          | 9  |          | 3     |          | 1  |          |       |          |       |          |         |
| 3         |              |          | 5     |          | 1  |          | 3     | 1        | 9  |          | 4     |          | 1  | 1        | 1     |          | 1     | 1        |         |
| 4         | 2            |          | 1     |          | 3  |          | 3     |          | 8  |          | 4     |          | 1  |          | 1     |          | 2     | 2        |         |
| 5         | 2            |          |       |          | 2  |          | 5     |          | 11 | 1        | 2     |          |    |          |       |          | 3     | 2        |         |
| 6         | 1            |          |       |          | 3  |          | 6     | 2        | 12 | 1        | 2     |          |    |          |       |          | 1     |          |         |
| 7         | 3            | 1        | 1     |          | 1  |          | 7     |          | 10 | 1        | 2     |          |    |          |       |          | 1     |          |         |
| 8         | 3            | 2        |       |          | 1  |          | 6     | 1        | 9  | 2        | 2     |          |    |          |       |          | 4     |          |         |
| 9         | 2            | 1        |       |          |    |          | 6     | 1        | 11 | 2        | 2     | 1        |    |          |       |          | 4     |          |         |
| 10        | 2            | 1        |       |          |    |          | 7     |          | 11 | 2        | 1     |          |    |          |       |          | 4     |          |         |
| 11        | 2            | 2        |       |          | 1  |          | 6     | 1        | 10 | 2        | 1     |          |    |          |       |          | 4     |          | 1       |





